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The Dental Laboratory Mechanic

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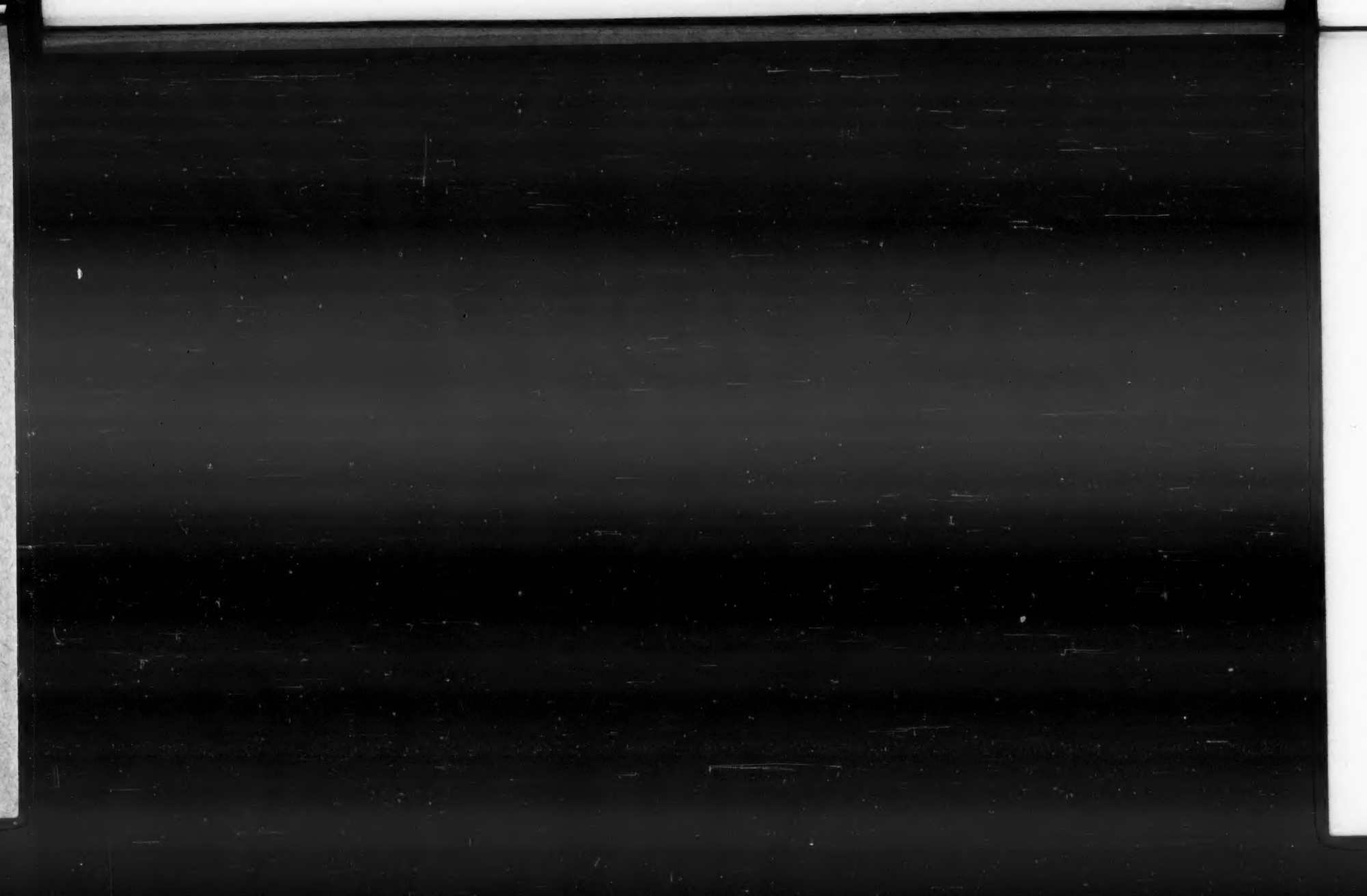

A Trade and Its Training

The Dental Laboratory Mechanic

By Ruth Woodruff

This study of an unusual trade—that of the Dental Laboratory Mechanic—was undertaken by Miss Woodruff in connection with her placement work for the White-Williams Foundation. It was conducted in Philadelphia during the years 1921–1922. In addition to furnishing us with specific information about this trade, it is of special interest for a number of reasons.

1. *It is typical of a form of qualitative analysis of a trade or occupation which should properly precede any attempts at the type of quantitative study suggested by Professor Yoakum in his paper on "Basic Experiments in Vocational Guidance."*[1]
2. *It is suggestive of the vocational possibilities of innumerable small and less well known trades and occupations.*
3. *It shows how the development of the trade has shaped not only the character of workmanship in it, but the problems of training as well.*

SCOPE OF THIS REPORT

IN THIS study forty-one local laboratories were visited, all but one of them by the worker making the report, and thirty-nine of the forty-one interviews took place between December 15, 1921 and February 15, 1922. Each laboratory contributed some information regarding the problem of training new workers entering the field. In addition to the laboratory visits the problem of training was presented to a few members of the dental profession proper. Among those interviewed were the Dean of the Evans Institute of the University of Pennsylvania, a dentist engaged in research closely allied to the problems of the dental mechanic, a practising dentist who is one of the few men in the city who prefer to do their mechanical work themselves and several other dentists employing laboratory assistants who have kept in close touch with the problems of the dental laboratory. The local Veterans' Bureau was also consulted in regard to their findings resulting from the placement of disabled ex-soldiers in the field.

[1] Journal of Personnel Research, Volume I, No. 1, pp. 18–34.

PECULIAR INTEREST OF THE FIELD

The choice of mechanical dentistry as the subject for occupational study was an especially happy one from two points of view. The general information obtained in the study of a trade that is demanding an increasing degree of skill from its workmen is unusual at a time when skilled trades tend to

deteriorate into a series of mechanical processes any one of which can be learned in a short time. The second point of great interest lay in the fact that the proprietors interviewed were in almost every case workmen first and employers and business men only secondarily. Their real interest seemed to lie in the fascination of the work itself and in the delight of good workmanship rather than in the success of their shop as a business enterprise.

To a layman the reasons for the great skill demanded of a dental mechanic are not obvious. Probably few are aware of the fact that it is the usual practice of the dentist in a large city to send work to the commercial laboratory or to employ an assistant for such parts of his work as the construction of plates, crowns, and bridges.

DESCRIPTION OF THE WORK

A brief summary of a common case may help to picture the skill required of and the responsibility for good work resting upon the dental mechanic. As a rule the laboratory mechanic does not see the patient's mouth. He is accustomed to construct the replacement ordered, using as a guide the plaster model made from an impression taken by the dentist which is usually supplemented by some brief oral or written instructions from the dentist. The procedure in even the simpler cases of Vulcanite, commonly called "Rubber" work, is complicated as may be seen from the following description prepared for this report by a dental mechanic.

In a case, for example, where all of the patient's upper teeth are missing and most of the lower ones are still in position the procedure may be described as follows: The dentist first takes an impression of the upper portion of the mouth, in either plaster or a modeling compound, as the case may require. He then finds the relation of the lower jaw to the upper one by having the patient bite into warm beeswax, hence this operation is known as "taking the bite." He next determines the shade of the natural teeth by comparing them with a group of artificial teeth varying in shade and arranged on a numbered scale and known as a shade guide. After this he chooses from a mould guide a tooth of the proper size, type and general shape to harmonize best. The impression, the bite, the shade number and the mould, together with any necessary instructions, are sent to the laboratory.

At the laboratory the case goes first to the man in charge of the vulcanite work, who notes the mould and shade as well as the instructions. The impression is then sent to the plaster room where the plaster boy first paints it with a separating medium, if it is of plaster, to prevent the plaster of which the model is constructed from uniting with that of the impression. If the modeling compound is used in place of plaster impressions, no preliminary preparation is necessary. Next a mixture of model plaster and water is made and is quickly introduced into the impression. Great care must be taken that the new plaster completely fills the impression, leaving no air spaces. In about twenty or thirty minutes, or after the model plaster has set, the plaster model may be separated from the original impression. The resulting plaster model closely resembles the upper portion of the patient's mouth. The model and the bite are now assembled and mounted on an articulator, a device which allows the lower and upper jaws to be manipulated as in chewing. At this point a layer of paraffin wax is placed over the surface of the model and the teeth are set in the wax. Much skill is required to set the teeth according to correct anatomical form and also in harmony with the teeth of the lower jaw. The wax is moulded and fashioned about the teeth to correspond to the natural gums.

The case is now returned to the dentist for trial in the patient's mouth. If any changes are necessary he makes them and returns the case to the laboratory to be finished. Thereupon a section of the wax, in that portion of the case corresponding to the roof of the mouth, is removed and a piece of sheet lead of suitable shape inserted and secured by three pins. This is now covered with wax. (The purpose of the lead is to create a space in the finished appliance, called a suction chamber, which helps to hold the plate in place in the mouth.) The process of flasking follows. The flask is a metal mould which is made in halves, so that it may be separated. The case is invested in plaster in this mould in such a manner that when the mould or flask is opened the teeth are held in place in one half and the model in the other. The wax is now removed and the space thus created filled with unvulcanized rubber. A test is necessary to make sure that the proper quantity of rubber has been used. Then the flask is closed and secured by bolts. It is now subjected to the vulcanizing process from one to one and one-half hours. When removed from the flask the case is finished by means of files, chisels, scrapers, sand papers, etc., and polished by means of felt wheels and cones and stiff brush wheels charged with pumice and water. The final polish is achieved by means of a soft brush wheel and whiting. The case is now returned to the dentist ready for the patient's use. Partial cases requiring clasp attachments, for example, require more skill. Gold work requires still more and must be supplemented by a knowledge of metals and alloys.

PICTURE OF THE TRADE

The interest taken in the problems discussed varied among the men in the trade. Naturally it was not possible to secure all the information desired from each one. In a few instances pieces of work that must be finished promptly prevented thorough discussion. At other times the information sought was sandwiched in among comments on the economic condition of Russia, the progress of Trade Unionism, and the opportunity America holds for foreigners today. In fact this type of interview was the most usual. One workman proprietor was interested in the treatment of mental defectives in the public schools, another was eager to outline an apprenticeship system he had followed at one time, the special abilities and school progress of the proprietor's own son provided the background in another instance.

As has been implied in the statement that the proprietors of the laboratories were workmen first and employers second, the number of workers was not large in any case. Twenty-eight was the largest force observed. In fact two thirds of the thirty-six laboratories in which the number of employees was ascertained had less than six men. Several men worked alone, the majority of these hoping to use an assistant in better times.

The study was made at the period of most marked business depression and it was clear that this trade is especially affected by industrial conditions in general. The attitude of the public is still said to be that dental care is a luxury not a necessity. But the reasons for the small number of workmen in a laboratory are more fundamental than the business depression. It must be remembered that each piece of work is individual, no two mouths are identical, and as a rule a high degree of skill is demanded in the execution of each bit of work. Although some specialization and di-

vision of labor can be effected the work demands supervision as a whole throughout the various processes. This eliminates production on a large scale. Then, too, since the capital necessary to set up in business is very small in a city that offers ready access to a wide assortment of stock, many workmen start in business for themselves at the earliest possible moment. This practice not only provides many small laboratories in the trade but is the fundamental cause of the sudden appearance and almost as sudden disappearance of many laboratories in the city in a given period. Naturally such enterprises are often ill advised.

As might be expected in an occupation where many enterprises have but a short life the picture the laboratory presents is a varied one. At one extreme one enters a shabby building peopled perhaps for the most part by vaudeville agencies and professional entertainers. Two narrow flights of stairs lead to a crowded noisy workroom. The air reeks with the fumes of the vulcanizer and is vitiated by the flame used in soldering. Artificial lights brighten the dark room at irregular intervals. Plaster dust and polishing rouge add to the general confusion and disorder. At the other extreme one may find housed on the top floor of an excellent office building a few men at work in a room that leaves little to be desired as regards order and cleanliness. Clean white enamelled surfaces replace the plaster strewn, wooden topped tables of the first picture. Sunlight floods the room and exhausts draw off the dust from the polishing wheels.

HOURS

The hours of work customary in the different shops varied. Here and there a shop reported a strict adherence to an eight hour day with the Saturday half holiday. In one instance the working day ends at three o'clock. As a whole the hours are irregular. "If our work is done we go home early, if it is not we work until it is finished. Often you may see my light up here far into the night," gives perhaps a fair picture of the general practice especially in the very small laboratory. The irregularity of hours made clear the justice of the complaint of young errand boys in the trade. One reported that in the busy season he worked until ten o'clock at night and at other times he has sometimes been employed until eight. This irregularity of working hours is accounted for to some extent by the seasonal nature of the work.

SEASONS

This seasonal irregularity is not a simple thing. It varies from shop to shop. Many statements were apparently in contradiction. "We are dull in summer, our dentists go away for long vacations," was offset by the statement: "My head man earns perhaps eighty dollars a week in the dull season after Christmas, but in the summer he earns one hundred and fifty dollars. That is when this neighborhood has the time and money for dental work." It was evident that the small laboratory working for a very few dentists serving a wealthy patronage presented a different picture from that of a large laboratory

doing work for many dentists practising in a residential section of very moderate wealth. In the latter community the usual income is perhaps regular but is taxed more heavily in winter than in summer. Still another story is that of the laboratory in a district whose workers are employed in an industry itself seasonal as the textile industry.

In addition to irregular hours the seasonal irregularity has other effects on the trade. The income of the workers diminishes in the slack season, since many of the shops operate on a wage plus bonus plan and the bonus varies with the net earnings. Occasionally learners are laid off for the dull period. On the whole the skilled workmen have continuous employment. The trade is said to be "steady."

WAGES

Another vital point in the trade's favor is that almost without exception the wages are conceded to be good. To some workmen of exceptional skill to whose duties perhaps considerable supervisory responsibility is added a weekly wage of one hundred and fifty dollars is paid, some receive one hundred and twenty-five dollars, but these earnings are rare. Twenty dollars to fifty dollars per week was the range of wages usually quoted for the ordinary workman. A good workman was said to receive at least forty dollars and if he is an expert specializing in one branch as gold work or gold castings his weekly income is usually from fifty to seventy-five dollars. The wages paid at present are declared too high by some proprietors. In their opinion the men receiving one hundred and fifty dollars are not earning that much money for the company. They are confident wages will come down. Many men complained bitterly of the low wages paid prior to the war.

LABOR ORGANIZATION

The causes of the high wage level for the trade were variously ascribed to the great impetus given to the work during the war, to the scarcity of the highly skilled because of the long period of training necessary, and to the effect of the union.

A detailed history on the rise and fall of the local union organization would be both interesting and informing. It would reveal the many factors tending to make organization difficult in a small highly skilled occupation in which the majority of employers are themselves skilled in the trade and in many cases continue to work at the bench. The proprietor who claims the honor of starting the union some years ago keenly regrets the attitude of both the proprietors and workmen who refused to cooperate. He feels that both groups acted against their own best interests. In his opinion the union had an excellent effect in the trade by limiting hours and raising wages. Many others agreed to these good effects. Whatever effects may still be observed the power of the union is now negligible. Its president admitted that it is nothing now but a name. He hopes to see its revival when conditions are not as favorable for opening small shops as they were at the time when the union was defeated. The union

was broken, the president said, by the combination of a large hostile laboratory with many of the small ones.

EMPLOYERS ORGANIZATION

At the present time there is a project on foot to form an organization of laboratory owners. The function of this is to be to set certain standards for work, to exchange new ideas and methods and to serve as a credit bureau that would keep on file for the use of all members information that would serve to prevent losses due to misplaced credit. One proprietor believed that an attempt would be made later to include the skilled workmen in the organization. Whereas some proprietors are actively in sympathy with this movement, others are just as actively opposed to it. The latter maintain that differences in standards of work and professional ethics would not permit them to place their reputation and other business assests at the mercy of such an organization by coöperating with the movement.

The proprietors' attitude towards one another is partially reflected in the above discussion. The unfriendliness, one to another, was very marked in several instances. Some went so far as to accuse their competitors of using base metals in place of gold. Sometimes this ill will seemed to have a racial bias. Occasionally the owner of a shop predominantly Gentile would report that Jewish shops have lower standards. In turn a Jewish employer says he is sure lower wages are paid and conditions in general are less favorable in Gentile shops than in Jewish.

The attitude towards the trade itself, however, is quite different. Almost unanimously it was given a favorable report. Of thirty-three who commented on the trade as a vocation, twenty-six praised it in such terms as: "excellent," "know of none as broadening in every way," "complicated and interesting," "gives constant opportunity to use one's ingenuity," "good money opportunity," and "excellent in the opportunity offered for going into business for oneself." Of the seven who expressed general dissatisfaction, some modified their statements in this manner: "would not commend the trade highly," "a poor line at present," and "fair, you do not get rich." The favorable attitude towards the trade seems especially significant in view of the present business depression. In spite of the optimistic outlook many felt that at present the trade is over-crowded and just now is not a good time to encourage young people to enter the field.

TRAINING THE DENTAL LABORATORY MECHANIC

With this picture of the trade as a background, the remainder of the discussion will concern itself with the problems immediately relating to learners in the field. Of the forty-one laboratories in which the problem was discussed thirty-two are training learners. Of the nine which do not take learners three were among the few confining their work to that of a very specialized nature.

In one instance a regular apprenticeship system was outlined. Here the employer increased the formality of the period of training by an interview

with one or both parents at the time the apprentice entered the shop; a graduated scale of wages for a period of several years; and a bonus to be paid annually according to the number of years the apprentice continued as a learner in the shop. The standard practice, however, seems to be very informal. Sometimes the new errand boy is not told that he will be given an opportunity to learn the trade but if he later grows interested in the shop work and shows ability, he is used as a learner. As a rule, however, the employers make it a point to call the boys' attention to the good opportunity to learn the trade in the shop and at the same time endeavor to select the most promising candidates. The sort of evidence they depend on in choosing candidates is interesting. Many note the rapidity of school progress, whether the boy's father is a skilled workman in a mechanical trade, what the boy does in his spare time, how he goes about a certain set task as sweeping the shop, etc. Some make it a point to have a surplus of boys for errands so that all may have a good opportunity to observe the workmen and to lend a hand now and then.

As an errand boy's work becomes of value in the shop his errand duties diminish and he is finally raised to the rank of a full time helper. In some laboratories the proprietor then takes pains to see that the learner serves as helper at each of the major divisions of the trade, at the plaster bench, the rubber work bench, and at the gold work bench in order to secure a general knowledge of the work as a whole. But such an opportunity cannot be taken as a matter of course. It is the custom in some laboratories to permit all round training only as a special favor. A boy might be at work for years and not advance beyond mixing and pouring plaster.

The value of serving at each bench in rotation is generally conceded even in case the new worker intends to specialize in a particular line ultimately. It seems that few learners, trained in laboratories become expert workmen in all branches. There are at least three important arguments to be advanced for the practice of giving each learner thorough general training before permitting him to apply himself definitely to one branch. In the event of unemployment there is a greater likelihood of qualifying for work in another shop. And since the best opportunity frequently lies in going into business for oneself it is of value to be in a position to judge intelligently the work of a partner or employee. Finally, since the remuneration is unequal for the different branches of the work, the head of a plaster bench earning less than a supervising rubber worker, and the latter less than the head gold worker, it is obvious that if a learner does not try his hand at both rubber and gold work after mastering the essentials of handling plaster, he may be arbitrarily excluding himself from the best paid line he is capable of mastering. Other things being equal it was frequently insisted that more work could be turned out by the system of a combination of specialists, with or without helpers, than by having each piece of work completed by the man to whom the work was first assigned.

As one proprietor expressed it, "This is an age of specialization and if we do not specialize we are not efficient."

The length of time necessary to become skilled was commonly estimated at from three to five years. A few placed the training period as low as eighteen months to two years. One held the extreme view that it took perhaps thirteen years to learn and at the end of that time one would still find much to learn. The length of time as in any trade has great individual variations according to the ability of the worker. As an example one employer pays X who has been with him six years nineteen dollars and Y who has worked at the trade three years forty-two dollars. In general it seems that a person promising success in the work should be earning sufficient income to support himself in from one to two years of full time work at the bench, and in the course of from three to five years his earning should reach a fairly high level. Some good workmen it is said learned more slowly than others and yet in time equaled or surpassed many whose initial progress was rapid. A very expert mechanic finds this to be true; a learner drags along at about the same low level for many months perhaps earning ten dollars per week and then unexpectedly he may begin to turn out work of a quantity and quality that merits a good income.

How to keep learners when they become expert is one of the most serious concerns of the proprietors. It is the reason some assign for ceasing to train new workers and it may prove an important factor in the movement away from the apprenticeship method of training. One outlined the problem in this way: "a boy comes to us for errand work at six or seven dollars a week. He is not worth that salary if we permit him to spend part of his time observing. Then we must raise his salary after some months in order to keep him. When he first changes from errand work to full time bench work he is worth still less than he is receiving. Thus, the first two or three years are a losing proposition. In order to get a return for this money we must manage to hold him for less than he might earn elsewhere for a time. In that period he pays us for his training. But it is hard to hold them when it is so easy to go into business for oneself without a thorough knowledge of the trade." One laboratory endeavors to solve the problem by taking workmen into the business and sharing the profits with them, as soon as they are expert. This employer points out the value of long experience in a well established laboratory prior to opening one of their own.

WHO ARE SUCCESSFUL?

What kind of person promises the most success as a learner of mechanical dentistry is a many sided question. Age is a factor which looms large in importance to the laboratory men. The consensus of their opinion is that learners should be young. From fourteen to eighteen years was judged the proper time to begin, with the majority opinion nearer the fourteen year limit than eighteen. A few dissenters emphasized the value of maturity in entering a trade of such com-

plexity and one so tedious, involving for the most part the careful use of small muscles. It happened that the ones urging youth had themselves started the work at an early age and vice versa the ones who advocated maturity had spent many years at other things before learning the trade. The major argument offered for starting early was that an older person would be too impatient for results to be willing to spend the period of time necessary to master the multitude of details essential to good work that can be mastered only by constant repetition. In regard to the question of age, the complaint was often heard that the Veterans' Bureau was making a great mistake in placing disabled soldiers in the field. They were said to be too old to master the details patiently. Incidentally, of seven who mentioned employing these older men for training, three reported success and four failure. Authorities in the dental profession seem inclined to the opinion that the work would usually be mastered more thoroughly in youth. From this evidence it would seem that the question of the most suitable age admits of no arbitrary decision.

As regards other personal qualities the attribute most frequently stressed was mechanical ability, next to that came intelligence as a factor in success, and the third place was given to patience. Patience was interpreted as the ability to take pains, to do minor work carefully, and at the same time to endure the tedium of this careful work. The relative importance of mechanical ability and intelligence was often carefully weighed. By some intelligence was stressed as an essential, by others it was said to be a great help in the business phase of the work but not essential to good workmanship. "Between intelligence and mechanical ability in a workman I would choose mechanical ability" was the dictum of a man of long experience both as employee and employer.

The question of the amount of education essential or desirable revealed wide differences of opinion. Many prefer to set the eighth B grade as a useful standard in selecting learners. Others say education is of no importance. One went so far as to recommend a good general education supplemented by some dental school training. A few urged as much education as possible. A knowledge of chemistry and metallurgy was found helpful by some. The local Veterans' Bureau has reached the conclusion that an eighth grade education or better is advisable in placing disabled soldiers in the trade. Their position would seem to be very well taken in spite of the fact that many of the most successful men in the trade do not themselves meet this standard, for as a group they appear to be men who would have completed the eighth grade at fourteen years of age had school attendance been compulsory until that age.

The physical requirements of the work are few. The polishing of both rubber and gold frees particles of hard dust some of which remain in the air in spite of exhausts. The fumes from the vulcanizer and the soldering flame tend to vitiate the air. For these reasons the Veterans' Bureau

makes it a rule to place no one at this work who is especially susceptible to diseases of the lungs. Other than general good health, good eyesight and unhampered use of one's hands are important.

WOMEN IN THE FIELD

No question was of more interest in the study than why men held the field almost to the exclusion of women. There are so few lines of work requiring both manual dexterity and high intelligence that women may enter without finding themselves poor competitors with men because of physical handicap that the possibility of their entering this trade seemed well worth investigating. In forty-one laboratories, none were found to employ women at the trade proper, one woman helped her husband with the polishing and hoped some day to learn other parts of the work. One was of general assistance to a mechanic who works alone. Her employer said she would never make a mechanic. A third laboratory employed a woman for baking porcelain, and a fourth used colored women for plaster work. In no instance were the women dental mechanics strictly speaking. Almost every person interviewed had known of a woman in Philadelphia who had been employed as a skilled mechanic but she was not to be found in this group of laboratories. Some said she had married several years ago and had given up the work.

The stand the laboratories take in this question is a divided one. Many said women would be excellent, better than men, and would be in the field today were it not that a woman considers five years too large a proportion of her working years to spend in learning a trade. She would prefer, they say, to study stenography for six months to a year. One employer felt that women lacked the leadership to supervise helpers in the trade and that therefore it would be of little value for them to enter the work since the employers would recognize this and shunt them off on a minor specialty rather than develop them into first class gold or rubber workers. Many gave such superficial reasons as these: conditions in the laboratories are not suitable for women, women do not like dirty work, the trade would spoil the appearance of their hands. At the opposite extreme from the first group who thought women would do well were those who either stoutly denied to women any trace of mechanical ability or else said that if they had it it was of a different sort than that of men, more along the lines of sewing and embroidering than of soldering for example. A person whose connection with a dental school placed him in a position to comment with some authority on these opinions said that there were women of his acquaintance who far surpassed the average in the mechanical part of their work but that as a whole women he had observed as dental students did not have the mechanical bent of men, because activities developing this ability had not been expected of them to the same extent as of men. Their training was usually along different lines. Among the reasons given as to why women would be better than men in the trade were these: women are

more careful, more conscientious, have more patience with detail, and have a better developed aesthetic sense.

SOME SHOPS OPEN TO COLORED MEN

It was gratifying to find that the opportunity of learning this trade is open to colored boys. One medium sized laboratory was manned entirely by colored men and employed three or four learners of whom one was a high school student working on a part time basis. Incidentally, of the two most highly skilled in this shop, one had completed a four year high school course and the other has had a partial high school course. In another laboratory colored workmen were employed side by side with white and an opportunity for training is offered colored boys in this shop on the same basis as white boys.

METHODS OF TRAINING

Closely allied to the problem of who may learn the work with best success is that of what is the best method of securing training.

A layman might naturally suppose that the most reliable training is to be secured by assisting a practising dentist. Several factors complicate this simple solution of the problem. One of these factors is that few dentists have enough work either to keep a mechanic busy or to give him a wide enough variety of cases in a reasonable length of time. In addition few successful dentists would find it worth while to spend the length of time from the chair necessary to supervise a learner. But more serious than either of these reasons is that the number of dentists capable of teaching the work is small and is diminishing. Although the mechanical or prosthetic work is a required part of dental training it is the custom of many students to send their laboratory work to commercial laboratories. This practice is so blatant, some mechanics say, that they have known students to hand in as their own work sample pieces borrowed from a laboratory show case. Dentists admitted this to be a practice and one said he knew a laboratory that did all the work presented by a group of recent candidates for a state license. While visiting a laboratory for the purpose of this study, two dental students were observed leaving laboratory work to be "fixed up" by the commercial laboratory. Therefore although some excellent mechanics have been trained by practising dentists, the opportunities for careful training in this way are limited and in all probability will grow more limited if the present practice of "faking" prosthetic work on the part of dental students continues.

The laboratories and the few dentists consulted agreed that the most practicable place to learn the trade at present is in a laboratory which is under the supervision of a mechanic of the first order. They agreed in questioning the value of the training received in schools for mechanical dentistry operated on a commercial basis. In fact, many said it was a waste of money to attend such a school.

In regard to training for the work in the future there is a difference of opinion. Some feel that the apprenticeship system is failing as a means of

training in this trade as they see it has in others and in time will be far less adequate than it is at present. They would have the dental schools face the question squarely by advocating a system of licensing dental mechanics and providing suitable courses to meet the needs of candidates for such licenses. One urged that the complete license be composed of units of different grades, thus permitting a mechanic to do certain parts of the work before he had completed the entire course. This would lessen the financial burden imposed on mechanics by a licensing system. It is doubtful, however, if the commercial laboratories are anticipating this revolution in the present method of training.

CONCLUSIONS

1. This study leads one to believe that mechanical dentistry offers a good trade opportunity at the present time. Furthermore it promises to require more skill and knowledge as the dental profession advances and as the public becomes more enlightened in regard to the dental profession and the mechanic's trade.

2. It would seem unwise to advise a person to enter the trade who had not completed the eighth grade, and to urge a person to continue in the work who lacks ability and taste for mechanical work. A quiet boy would probably be happier in the trade than a very active, restless boy who needs plenty of exercise of the larger muscles.

3. For the present it will probably be difficult to place girls in the field, although such placements would perhaps give valuable information on many general problems of interest in placement work.

4. This study failed to glean sufficient information in regard to each laboratory to permit one to choose accurately the best laboratories for training purposes. It did show that there are great differences among them and that placement should be made with care.

5. It seems probable, especially in view of the greater degree of responsibility for public health devolving upon the dental mechanic, that the state will in time regulate the practice of this trade by requiring supervised training and a state examination for license. Where the training would be most suitably offered is a problem. Surely not in the school conducted for commercial purposes, it would seem.

6. An association of both laboratory proprietors and skilled workmen would have an excellent field in which to work for higher standards of practice by the dissemination to all of its members of improvements in both the dental profession and dental mechanics trade.

Personnel Research Series

SINCE the JOURNAL OF PERSONNEL RESEARCH first made its appearance, now some months ago, it has been evident that it was publishing only a part of the research studies dealing with personnel and related problems, which, because of their interest and merit, should be reaching the public. The appearance of the JOURNAL unearthed studies that were too lengthy in presentation and too important in content to be adequately condensed and presented as magazine articles. On the other hand, some of those studies were too short for publication in the ordinary book form. Others remain unprinted because, while important from an industrial as well as a scientific point of view, they have not promised a wide enough audience to tempt the commercial printer. The Personnel Research Federation has conceived it to be its duty to make such studies available to the sciences and to industry.

To this end, Personnel Research Federation has entered into an agreement with the Williams & Wilkins Company of Baltimore, for the publication of a Personnel Research Series. It will publish researches, reports, and monographs on personnel problems and in the sciences that contribute most directly to the development of personnel research. The editorial policy and purposes of the Series will in general be the same as those of the JOURNAL. The aim will be to select for publication primarily those studies which add to their scientific importance a degree of practical value and popular appeal.

The Series will be issued in a form that will be convenient as to size, legible as to type and reasonable as to prices, the intention being to give each volume the widest possible circulation, both among those interested in research work and those engaged in practical personnel administration. While edited under the auspices of Personnel Research Federation, the Series will not be an integral part of the JOURNAL. Each number of the Series will be issued separately. Probably the differences in length and printing cost will make necessary varying prices.

In order that the subscribers to the JOURNAL OF PERSONNEL RESEARCH may be currently informed, each number of the Series will be announced in advance in the JOURNAL. This announcement will take the form of a condensed article or review of the forth-coming Series number. In accordance with this policy there appears below a statement regarding the first number of the Series.

Job Analysis and the Curriculum

Based on a Study of Printing Trade Executives

THE present volume is a study of a special use of job analysis. It is based on researches made at Carnegie Institute of Technology during 1920–1921 by a staff under the direction of Dr. E. K. Strong, Jr. It is reported by Dr. Strong and by Richard S. Uhrbrock, who was one of the research workers, and is now connected with the personnel work of the Western Union Telegraph Company.

Briefly stated, the monograph deals with the problem of scientifically preparing curricula to train workers, particularly executives, to do definite, specific work. Job specifications for commercial printing executives are presented. A curriculum designed to prepare young men for positions of responsibility in the field of printing, is included.

This study is of interest, not only to printing executives, but to executives in every industry where new men must be trained for important jobs. Job analysis is a tool of primary importance in discovering the elements of jobs, and the inter-relationship of those elements. Data gathered through an analysis of jobs may be used in other ways besides curriculum construction. Salary schedules may be worked out in terms of the complexity of jobs, and responsibilities of workers. Promotional pathways may be discovered. Manuals for interviewers may be prepared. The personal, mental and educational requirements necessary for the successful performance of work may be determined.

The educator will be interested in this work as a study in method. He will see how easily the principles employed here can be made to function in preparing curricula for other purposes.

Job analysis has been employed only recently, as a tool for gathering data to be used in constructing vocational curricula. The era is over when a curriculum could be drawn up during the course of an afternoon by a group of experts. A study of life conditions—jobs—is being demanded before a reliable course of study can be outlined. The right of students in vocational courses to be taught to do the things actually done "on the job" is beginning to be recognized.

The problem before the faculty of the Carnegie Institute of Technology was clean-cut. In the Department of Printing a serious attempt was being made to prepare young men for positions of authority and responsibility. During the Summer of 1920 a careful analysis was made of the duties, qualifications, routes to the job, and probable lines of promotion of all the executives in five representative

printing plants in Pittsburgh. Later, the same careful survey was conducted in five of the large establishments in New York. As a result, job specifications were assembled covering the functions of ninety-four executives in ten concerns.

The research staff felt that they knew *what printing executives did.* The next problem was to determine *what they had to know* to do their work. Here the actual work of constructing a curriculum, to train men vocationally, began. The duty lists were examined with extreme care in order to determine the courses—and the content of courses—that should make up the new curriculum. The minuteness of this analysis can be illustrated. "For example, sales managers, general managers and presidents frequently are called upon to meet customers and to explain the details of a piece of printing to them. For a man to perform this apparently simple duty it is necessary for him (1) to have some training in *English* so that he can explain in an understandable way just what can be done. Quite obviously, this is not the type of English that usually is taught in a college course. As he talks with the customer he should know (2) some of the technique of *handling men.* Familiarity with (3) *shop processes and shop methods* is a valuable asset in determining the length of time required to do a job, the cost, and the appearance of the finished work. The man who meets customers should know (4) *how to estimate.* Whether or not an order is placed may depend upon this factor alone. He should know something of (5) *drawing, lettering and free hand sketching* so as to illustrate what he says and to "sell his idea" concerning design to the customer. (6) *Mathematics* is necessary so as to figure sizes and weights of paper and cost of finished work. Frequently, when large orders are placed, or when several editions are required, a contract is drawn up and signed. Here some knowledge of (7) *Law and Contracts* is of value. The executive should know something of (8) the *allied trades to printing,* particularly engraving, so as to place that information at the disposal of the customer. Finally, a knowledge of the principles of (9) *Advertising* and (10) *Selling* contribute to the success of the man who hopes to dispose of his product. The complexity of the duties of the average executive are not realized until they are analyzed in this way. Then the problem of building a curriculum to train executives assumes gigantic proportions."

In this monograph is outlined the method employed in securing data as to the nature of executive work. Specifications are presented covering the duties of thirty jobs or functions in the field of commercial printing. A functional chart is included which typifies what is to be found in an average plant. These sections are of interest to those printing executives who are desirous of understanding the organization of their business as expressed in the activities of their men. The remaining sections outline the steps employed in constructing a curriculum for training men for executive positions. A bibliography of ninety job analysis references completes the monograph.

News Notes

INTERNATIONAL WELFARE CONFERENCE

On Sunday, July 2, over fifty welfare workers representing ten different countries arrived at the romantic Chateau d'Argeronne to spend a week together for the purpose of discussing the aims and methods of industrial welfare work. "At 5 o'clock the hostess, Mademoiselle Renee de Montmort gave a delightful address of welcome and formally introduced each delegation to the conference."

Regular sessions began on Monday and covered surveys of legislation, industrial conditions, aims of welfare work, and detailed reports of various types of welfare work as undertaken by the ten different countries represented at the conference.

Miss E. T. Kelly of Messrs. Debenhams Ltd., London, spoke of the obvious possibility of welfare work as such ceasing to exist in those places where welfare principles had been worked out for some time and where specialization is the tendency of the moment. For this reason it is of the utmost importance that the aims of a welfare department should be clearly defined, for if they are not, the department may gradually be eliminated and its place appropriated by specialists, without any proper consideration having been given to the matter. Miss Kelly admitted that she is of the opinion that "though a very good case indeed can be made out for specialized departments, there would be a grave loss if the welfare worker dropped out of the factory organization, at any rate, for some time to come." Without suggesting that specialists are not needed she maintained that "Welfare has something to contribute to the common fund over and above the sum of all the specialists." Miss Kelly gave as examples of the specialists whose presence is essential and whose help is invaluable to us, Factory Inspectors, Sanitary Inspectors and Trade Board Inspectors also Doctors, Nurses, Educationalists, Psychologists, Club Workers and other Social Workers. All these look at factory life from their own point of view.

It is perfectly true that welfare work approves of keeping the law and improving the standard of conditions required by law, of encouraging the workers to educate themselves, of efficiency in production and of all the rest. Do we not spend most of our time trying to do these things? and yet welfare work aims at something more than all this; something to which if we attain it all these things will be added.

Miss Kelly likened a welfare worker who, in a pioneer job has been successful enough to set up a more or less complete organization which functions well, to the pilgrim who has climbed the Hill Difficulty, and can see the country through which he has to travel and can see some of the dangers which beset the way and some of the rough places which have to be crossed, and in the distance the Delectable Mountains which some day he hopes to reach. But what do the Delectable Mountains represent? Are they worth reaching? In other words when we have organized all the special departments for caring for the physical, mental and moral welfare of the worker, have we not finished our work? Had we not better gracefully retire from the scene and if not, why not?

The answer that welfare work is a coordinating agency is true to some extent, but is not really a satisfactory justification for the continued existence of a special person to undertake it. Surely coöperation could be arrived at by frequent meetings of the heads of all the specialized departments.

Miss Kelly thinks that the only real justification for our continuance as welfare workers, is to be found in the conception of the organic structure of industry. "It is

only when the Hill Difficulty is climbed that we can see the real and ultimate aim, which is to realize the business, the industrial enterprise as a living organization, made up of parts in organic relation with each other, and itself having as function the service of the community of which it forms a part."

In applying this analogy, Miss Kelly reminded us that every part of an organism has a function to perform for the good of the whole, and that if the function is not performed, the part becomes diseased or atrophies. In industry today, none of the parts are in an entirely healthy state, and some are ceasing to function altogether, and often the firm itself does not regard its work of production as a service to the community. The point that concerns us today, is that before any improvement can be hoped for these various parts must adjust their relation with each other and society as a whole, and must consciously accept the fact of the organic structure of Industry.

Miss M. L. Fledderus, Chief of the Social Department, Leerdam (Holland), Glassworks, said: "Broadly speaking, welfare work in Holland seems to me, as in other countries, to have arrived at a transition state. I have the impression that it chiefly looks to America for the lines on which it will go on working.

"The paper of Miss Odencrantz confirmed my expectations in this direction. Whenever seeking solutions myself, I have found that unconsciously my brain turns to America, and my heart to England. I think that when I take care of a harmonious interaction of both these superior organs, no harm will come to me.

"Yet it is not easy. Over and over again one feels the need of very specially organizing, and next to that need there remains the fear of organizing the soul out of the thing. I think in this respect it would be a help always to keep in mind that welfare work is not an end in itself, it is a means to better, might we hope very different, social conditions."

Miss Louise C. Odencrantz, Messrs. Smith and Kaufmann, Inc., New York, in her paper on "Welfare Work in America" suggested a preference for the term "personnel work" to supplant the phrase "welfare work" for the field covered by the conference.

Friday and Saturday afternoons were devoted to the consideration of the report from the committee appointed to draw up a general definition of the aims and basis of Welfare Work. After much discussion it was agreed by the conference that the following recommendations should be referred to the National organizations for consideration:

1. That the name "personnel work" be substituted for "welfare work."

2. That the following statement be adopted as a basis of this work:

The true function of industry, is to serve the community. In fulfilling this function, industry should render the best possible service, with the least possible effort and cost. At the same time it should conserve and develop in industrial life the spiritual, mental and physical well being of all who share in rendering this service. In any economic system, the functions of the management of an industrial organization should include that of properly coördinating the human relations and of making the best possible adjustments between the individual and the work. This function is called "personnel work."

It was recognized that the present Conference was purely a preliminary one, and the members had no authority to make decisions which could be binding on their respective organizations.

It was therefore decided that a further International Conference on "personnel work" should be held in 1924, with a view to forming an International Association for "personnel work." At the invitation of the Dutch representatives, it was unanimously agreed that the Conference should be held in Holland.

It was agreed that an International Committee should be formed consisting of a representative from each of as many countries as possible, to organize the 1924 Conference, to prepare a draft constitution of the International Personnel Association, to study questions relating to personnel work in each country and to undertake any other relevant duties. This committee shall en-

deavor to meet in 1923. In the meantime an interim committee was appointed to "carry on" consisting of one representative of each delegation present at the Argeronne Conference. The following were appointed: America, Miss L. Odencrantz; Belgium, Miss Radermaker; China, Miss E. Johnston; France, M'dle. M. Diemer; Great Britain, Miss E. D. Newcomb; Holland, Mr. P. M. Cochius; India, Mr. W. H. Wiser; Sweden, Miss S. Freidholm; Switzerland, Prof. E. Zueblen. Miss M. L. Fledderus of Holland was good enough to undertake the work of secretary with Miss Voysey as assistant secretary, and possibly the assistance of a representative of the International Labor Office at Geneva. It was also decided that countries having no National Personnel Association be urged to form one as soon as possible.

COURSES IN INDUSTRIAL HYGIENE

One of the interesting evidences of development in the field of Industrial Hygiene is the announcement of Harvard University of courses that are now being offered in their School of Public Health. Training in this field has become very well developed, as illustrated by the nature of the work offered. The courses are, in brief:

1. An intensive course of one month (96 hours) in Industrial Hygiene, designed to furnish an intensive review of the problems and methods of industrial medicine. This includes;

A. Industrial Medicine—Industrial Toxicology, clinical industrial medicine, and clinics, industrial clinic.

B. Industrial Medical Practice—Dispensary organization, physical examinations, industrial psychiatry, health education, nutrition and mercantile health work.

C. Factory Hygiene—Ventilation, illumination, sanitary installations, and industrial seating.

D. Industrial Operation—Industrial organization and methods.

E. Labor Legislation—Workmen's compensation laws, women and children in industry.

F. Field Investigation.

2. A general course whose character is determined by the previous training of the individual student in question. Among the subjects treated are;

A. Industrial Toxicology—Lectures, conferences, and assigned reading upon the industrial poisons together with visits to factories and definite studies of field conditions.

B. Ventilation and Illumination.

C. Vital Statistics—Lectures and laboratory work designed to familiarize the student with the facts already well established in this field, with the methods of graphical representation, and with the basic theory of probability and correlation necessary alike for the proper analysis of statistical data and for the adequate layout of any contemplated statistical survey.

D. Advanced Courses in Physiology—Circulation, Physical Chemistry of the Blood, Respiration, Metabolism and Nutrition, The Endocrine Glands, Physical Chemistry of Physiological Processes, Demonstrations in Mammalian Physiology, Fundamental Principles underlying the Activity of the Nervous System, Fatigue and Repair.

Opportunities for research and special study are also given to properly qualified students. In addition, special arrangements may be made enabling the student to take advantage of some of the graduate courses given by Harvard University Medial School, and Massachusetts Institute of Technology.

The faculty includes among others;

Professor W. B. Cannon
Associate Professor C. K. Drinker
Dr. Arthur B. Emmons, 2nd
Dr. Alice Hamilton
Professor Roger I. Lee
Professor Edwin B. Wilson
Dr. Wade Wright

COURSES AT BUREAU OF PERSONNEL ADMINISTRATION

The Bureau of Personnel Administration offers for the winter season two series of evening lectures of thirty lectures each, one on "Personnel Administration—Principles and Practice," and the other on "Personnel Administration and The New Industrial Order."

The aim of the former, as stated in the announcement, is to analyze the human problems of industry and government, and evaluate standard methods of employment, health and safety procedure, systems of reward, and joint relations plans. Topics such as the following are taken up, each lecture being followed by discussion.

The Field of Personnel Administration
Personnel Leadership
Methods of Selection—The Physical Test
Methods of Selection—Mental and Trade Tests
Job Analysis and Job Specifications
Methods of Factory Labor Analysis
Transfer, Promotion and Dismissal
The Community Relations of a Personnel Department

The other course analyzes urgent managerial problems and the technique of leadership. It constructively treats the formulation of personnel policies, standards and methods; the technique of associated effort, will and morale; the motivating forces of real efficiency. Among the topics touched upon are:

The basis for common understanding and action—personnel research.

The educator as the rationalizer of personnel standards.

Educating the public to understand personnel problems and to appreciate personnel performance.

An evaluation of personnel literature and agencies.

The business cycle and constructive personnel procedures.

Both courses are given under the leadership of Dr. Henry C. Metcalf, assisted by specialists experienced in their respective fields.

INDUSTRIAL RELATIONS LIBRARY AT PRINCETON

Through the generosity of John D. Rockefeller, Jr., there is to be established at Princeton University, a Library on Industrial Relations. This entails an annual grant of $12,000 for a period of five years.

The realization that such a library was needed, came as the result of Princeton's experience with the Pliny Fisk Library, where she had already gathered much valuable material regarding the interpretation of current economic information and facts. It had thus come to be regarded as one of the most complete libraries of its kind and was a source of information not only to those directly connected with the university, but to business men and industries throughout the country. It is hoped that the new library, in the same way will prove useful to students, professors and outsiders alike.

According to a statement given out by President John Grier Hibben:

"The library will include pamphlets, documents, reports and books dealing with the interpretation and discussion of industrial relations and will seek to bring together all available data on the actual establishment and working out of industrial relationship plans. Digests will be issued from time to time concerning developments in the handling of industrial relations problems.

"The library will be in direct charge of Dr. Robert F. Foerster, who has been given the rank of Professor of Economics at Princeton. He will have a skilled librarian as his assistant, thus being free to spend a portion of his time in the field studying the actual situation as to industrial relations in the United States. . . . Dr. Foerster has made extensive studies in social and labor conditions in this country and Europe."

OFFICE MANAGERS DISCUSS PERSONNEL PROBLEMS

The Third Conference of the National Association of Office Managers, held in Washington, D. C., during the latter part of May, gave a great deal of attention to personnel problems, such as employment methods, the use of job analysis, training office workers, and the case of selective tests.

Dr. John B. Watson addressed the Conference on the subject of selecting employees and denounced as unscientific the character analysis schemes commonly found in use. Mr. M. B. Folsom of the Eastman Kodak Company led a round table discussion on Tests for Clerical Employes. He stressed

the need for thorough job analysis of all office jobs and for standardizing occupations in all offices. A representative of Jordan, Marsh and Company reported that the use of tests in selection had resulted in turning down nine-tenths of the applicants, but had given the establishment a better class of help than it had ever had before. The Army Alpha test was one of the tests used.

Miss E. H. Meyers of the Curtis Publishing Company led a round table discussion on the Determination of Compensation, and explained the methods used in her Company to determine the ability of each employee and his value to the Company. An endeavor is made to measure the actual amount of work the employers turn out. Daily time cards are the basis for determining the pay of each worker. Bookkeeping work is measured on a point basis; verder cyclometers are used on typewriters. Some operations had been time-studied. An increase in production was attended by a tendency toward decreased errors.

Standard practice routine for office manuals was discussed by such authorities as Mr. H. A. Piper of the DuPont de Nemours Company, Mr. F. A. Woolford of the Retail Credit Company, and Mr. Hamon of the B. F. Goodrich Rubber Company. The DuPont Company has developed a loose-leafed manual dealing with all kinds of clerical work handled through the main offices and keeps all the information up-to-date. The Retail Credit Company found that by carefully describing and charting office opertions, increased production resulted. The Goodrich Company issues twelve booklets for the instruction of stenographers.

Modern office planning came up for discussion on the last day of the session. Mr. Harry A. Hopf was the principal speaker. He illustrated his remarks throughout by his own experiences in planning and reorganizing offices. The location of lockers, height of ceilings, color of wall paint, heat, light, and ventilation were all dealt with in relation to the health and efficiency of office workers. Light yellow on side walls and a full white on ceilings was recommended as the best color combination. A combination of full indirect and semi-indirect lighting would furnish the proper amount and kind of illumination. The ordinary office chair came in for severe condemnation as a cause of fatigue and therefore lack of production.

The new officers of the association are: President, F. L. Rowland, of the Gilbert and Parker Manufacturing Company; First Vice-president, George R. Hulverson, Office Manager of the Burroughs Adding Machine Co.; Second Vice-president, L. E. Stacy, of the Spirella Company auditing and planning department; Secretary, Geoffry S. Childs, Office Manager of the New York City branch of the Alexander Hamilton Institute; Treasurer, C. W. Kirkpatrick, of the Burroughs Adding Machine Company.

NOTES FROM ABROAD

The International Labor Review for June, 1922, (p. 911) gives an account of the Third Congress of the International Federation of Trade-Unions, at Rome, April 20–26, 1922. The American trade union movement was not represented. The history of the international trade union movement and the membership of the Congress are presented in tabular form. Two important resolutions of this Congress are given in full, one dealing with proposals for the economic reconstruction of Europe, and the other with methods of combating militarism.

The same issue, under Notes on Industrial Hygiene, reviews some recent literature of the (British) Medical Research Council, Industrial Fatigue Research Board on fatigue. Reviews are also given of recent literature on lesions due to electricity, efficiency of air-conditioning systems, chronic industrial poisoning from benzol, and maternity and industrialism.

Under Notes on Vocational Guidance, this issue reviews the work of the National Institute of Industrial Psychology of Great Britian, and the first number of its Journal; the work of the Barcelona vocational Guidance Institute; and recent developments in vocational Guidance in Czechoslovakia, Germany, and Geneva; and recent literature on vocational guidance.

The work of the Institute may be ranged under six headings:

1. The study of the requirements of various industrial and commercial occupations, and the elaboration and application of suitable tests so as to secure (a) in coöperation with industry and commerce, more efficient and scientific selection of workers, and (b) in coöperation with the schools, more reliable guidance for children when choosing their life's work.

2. The investigation of the best methods for applying human energy in different factories, offices, etc., especially in regard to (a) the elimination of unnecessary movements, (b) the most advantageous distribution of rest periods, (c) the reduction of monotony and increase of interest.

3. The determination and realization of the conditions which tend (a) to the maximal health, comfort, and well-being of the worker, and (b) to the best relations between management and labour, e.g., in regards to lighting, ventilation, methods of payment, labour representation, etc.

4. The study of the factors influencing the sale of products, e.g., advertisement and designing.

5. The provision (a) of lectures to employers and to workers, and (b) of training courses for managers, foremen, welfare workers, and investigators.

6. The encouragement and coördination or research work on industrial psychology and physiology throughout Great Britian, and the publication of the facts established by such research in a form which will indicate their practical value.

IRREGULARITY OF EMPLOYMENT IN THE COAL INDUSTRY

Speaking before the division of industrial and economic problems of the National Conference of Social Work held at Providence, R. I., June 26, Mr. George Otis Smith, Director of the U. S. Geological Survey, said in part:

"What coal producers and coal consumers alike need is reform of the business rather than compromise between parties to the controversy, and in this reform it is absolutely essential that the mine worker should coöperate with the mine operator. Too long have the mine owners treated the coal business as private privilege and too long have the labor leaders with no less monopolistic attitude obstructed every move for underground efficiency and economy. The people's coal costs too much because of the mistaken idea that mine owner and mine worker can continue to fight over contracts and rules. Cheaper coal and larger earnings will come when engineering is emphasized more and bargaining less.

In terms of engineering, the coal industry has a bad load factor; translated into human relations, poorly functioning mines mean poorly employed miners. A longer working year would seem at first glance desirable to mine owner, mine worker and consumer alike. Why not get it?

The trouble with our soft coal mines is not so much the broken year as the broken month, the broken week, and even the broken day. The running time is broken into small pieces, for mine operation is not simply seasonal, it is intermittent. In that theoretical mine of the statistician, the average mine of the country, we find November a longer month than June, by 25 per cent, and June longer than April, by 10 per cent, and yet the working time in a normal November is only 19 to 21 days. And irregularity creeps into the working week and the working day, for Friday and Saturday are normally shorter days than Monday. Granted that the workers in other industries suffer the handicap of seasonal unemployment, our problem, and the national problem just now, is the betterment of the working time of coal mines, and especially bituminous coal mines.

That average mine is located nowhere in particular, and the average working time by states and fields shows marked and significant differences. The average year in the Southern Appalachian region is a fourth longer than the average year in the Central Competitive District. With 215 days as the average year for the whole country, we find a 273 day average year in New Mexico, 247 days in Alabama, and 223 days in West Virginia, as against 202 days in Missouri, 197 days in Illinois, and 192 days in Oklahoma. For the soft coal miner

this is plainly not a land of equal opportunity.

Markets, quality of coal, mine costs (including wage scales), and car supply are all factors contributing to these differences in mine employment. Unfortunately, we can guage results better than determine causes; we know the industry to be wasteful, but where are the leaks? The lack of efficiency and the losses due to irregular operation are not universal, for many individual mines work 300 days in the year. Indeed, in 1913, when the bituminous mines averaged 232 working days, one-fourth of the half-million men in the industry were employed in mines that worked 280 days or more and nearly 50,000 of them in mines that worked 300 days or more. Our problem in industrial betterment, then, is simply to bring the average mine up to the best."

BUREAU OF THE CENSUS ON OCCUPATIONS OF CHILDREN[1]

The statistics presented show that for both sexes and for each sex there was a very marked decrease from 1910 to 1920 in the number and in the proportion of children reported as gainfully employed. The decrease is the more striking because, with the exception of a slight decrease from 1900 to 1910 in the proportion for males, each of them follows an increase at each of the three preceding censuses.

In each geographic division there was a decrease[2] in the proportion of children engaged in gainful occupations, the decrease being especially striking in the West North Central division and in each of the three divisions comprising the South—the South Atlantic, the East South Central, and the West South Central divisions. The decrease was more marked for males than females. It extended to each state, with only the District of Columbia having an increase; and in most of the states the decrease was pronounced. In the case of females, only Arizona and the District of Columbia showed an increase in the proportion gainfully occupied.

The decrease in the proportion was general in the cities of 100,000 inhabitants or more as well as in the states. In the case of males, only six, and in the case of females, only three, of the 68 cities of 100,000 inhabitants or more showed an increase in the proportion reported as gainfully occupied. The decrease was more marked in the case of males than in the case of females, being especially striking in certain cities.

The statistics show that while the number and the proportion of children so engaged in 1920 were very small in many of the cities having from 25,000 to 100,000 inhabitants, they were rather large in others of these cities. A comparison of the totals with the 1920 totals shows that the proportion engaged in gainful occupations in 1920 was somewhat larger in the case of males and somewhat smaller in the case of females in all cities of 25,000 and under 100,000 inhabitants than in all cities of 100,000 inhabitants or more. For males, the proportion was 8.1 per cent for all cities of 25,000 and under 100,000 inhabitants, as compared with 7.7 per cent for all cities of 100,000 inhabitants or more; while for females the proportion was 4.5 per cent for all cities of 25,000 and under 100,000 inhabitants or more. In the smaller cities, the proportion of children engaged in gainful occupations in 1920 was exceptionally large in Pawtucket and Woonsocket, R. I., and among the large cities the proportion was exceptionally large in New Bedford and Fall River, Massachusetts.

The report shows that the occupations in each of which there was a decrease in the reported number of children are numerous and that these occupations cover a wide range of activities. The largest numerical decreases, however, are shown for agricultural pursuits, especially for two occupations—"Farm laborers (home farm)" and "Farm laborers (working out)." These two occupations together show a decrease of 783,322, as compared with a total decrease of 929,367 for all occupations. The large decrease in the number of children engaged in agricultural pursuits, and, also, that in the number of farm laborers, is the

[1] By "children" is meant "males and females from 10 to 15 years of age."

[2] The period of time under discussion is, unless otherwise stated, 1910–1920.

more striking because in each case the decrease followed a large increase from 1900 to 1910.

As stated elsewhere (see p. 5), the great decrease in the number of children employed as mine and quarry operatives probably resulted largely from increased legal restrictions against such employment. In the cases of most of the other occupations, however, the changes in the number of children employed are, in general, in line with similar changes in the number of persons of all ages employed, though for children the degree of change frequently is different from that for persons of all ages. The great decrease in the number of children employed as servants, for example, is in line with, though greater in degree, a similar decrease in the total number of persons employed as servants.

The statistics presented in the tables of this bulletin show that there was a general decrease in the proportion of children engaged in gainful occupations—a decrease which was not limited to either sex, to any class of the population, to any section of the county, to any field of occupations, or to any special occupations. Statistics not here included show that, in general, this decrease for children was but part of a corresponding general decrease for all persons.

Most prominent, probably, of the causes which contributed to the decrease in the proportion of children gainfully occupied was the change of the census date. The change of the census date from April 15 in 1910 to January 1 in 1920 undoubtedly had a pronounced effect on the number of children returned as pursuing those occupations which are seasonal or largely seasonal. The great decrease in the number of children engaged in agricultural pursuits is believed to have resulted largely from this change. In most sections of the United States agricultural work, especially the work of field laborers, is at or near its lowest ebb in January. Because of this fact, taking the census in January undoubtedly resulted in a smaller number of childen being returned by the census enumerators as engaged in agricultural pursuits than would have been returned had the census been taken as of April 15, as it was in 1910. It is believed that when the enumeration was made in 1920 (as of January 1) many children usually employed as farm laborers were not then at work and were not returned by the census enumerators as gainfully occupied. This appears to have been true especially in the case of children living on the home farm. The enumerators' schedules show that a considerable proportion of such children were returned as neither attending school nor being gainfully occupied.

A considerable part of the great decrease in the number of children engaged in agricultural pursuits, especially in the number working as farm laborers, is believed to be only an apparent decrease, and due to an over enumeration in 1910. A comparison of Twelfth and Thirteenth Census occupation statistics (see Thirteenth Census Report, Occupation Statistics, pp. 28 and 29) showed that from 1900 to 1910 there was an increase of 34.8 per cent in the number of children reported as engaged in agricultural pursuits. Since there was no similar increase in the total number of persons engaged in agricultural pursuits, and since there was a marked decrease in the number of children engaged in nonagricultural pursuits, it was believed that the great increase from 1900 to 1910 in the number of children engaged in agricultural pursuits was in large measure the result of a difference in the basis of enumeration at the two censuses, due to a difference in instructions to enumerators rather than to any actual increase in the number at work. It is probable, also, that the Thirteenth Census enumerators working under more liberal instructions and construing these instructions more loosely, returned as gainfully occupied some children—especially farm children—who would not have been so returned by the Fourteenth Census enumerators.

The decrease in the number and in the proportion of children engaged in gainful occupations undoubtedly was the result, in part, of increased legal restrictions against child labor, of better compulsory school attendance laws, and of more efficient enforcement of these two classes of law. For example, the marked decrease in the number of children employed as mine and quarry

operatives probably was in large measure the results of increased legal restrictions against such employment. It is probable, also, that the greater popular disapproval of child labor decreased the tendency to employ children.

THE MENTAL GROWTH OF CHILDREN

The University of Iowa Service Bulletin, under date of June 17, 1922, contains an interesting account of some researches on physical and mental measurements of children, under the caption: "The Mental Growth of Children."

"History contains no record of the beginning of consecutive physical measurements on the same child. Perhaps some half-savage father carried on a crude sort of scientific investigation in physical growth by chipping a tree to show the successive heights of his son. With the invention of the measuring-stick he could keep this record even after the tree was cut down. For measuring mental growth, however, we have not had any measuring-stick until very recent years, and it is still not a very good instrument. Until a few years ago, moreover, no one had undertaken to make mental measurement of the same child year after year in order to study the process.

The first results of such an investigation, undertaken at the Child Welfare Research Station in the first year of its establishment, 1917, and still in progress, have just been published by Dr. B. T. Baldwin and Dr. Lorle I. Stecher in the series of "Studies in Child Welfare." (Vol. II, No. 1) entitled "The Mental Growth Curve of Normal and Superior Children." For this study 143 children were given two to five annual reëxaminations by the Stanford (Terman) Revision of the Binet test for general intelligence. A large majority of these children have received an additional examination this spring, making this the largest collection of consecutive examinations on record in any psychological laboratory.

The examination consists of a series of common-sense questions and simple performances within the grasp of any normal child, even without special educational training. Tests are grouped by years, and the material is so graded that the average child of a particular age would be able to pass the tests for his age, and the superior child to pass additional tests at the higher ages. The child's score is interpreted as the "mental age" which is to be divided by the chronological age to give the "Intelligence Quotient" (I. Q.), or index of brightness. For example, the average ten-year-old has a mental age of ten years and an intelligence of 100. If a child of ten is a year and a half advanced mentally, his I. Q. is 115. The children studied were grouped in two classes, those having an I. Q. between 90–110 being called average, and those having an I. Q. over 110 (some as high as 167) being called superior. Fourteen charts and 16 tables are included in the study.

Three general problems concerning the intellectual development of children were dealt with: (1) The Mental Growth Curve; (2) The Possibility of Prediction of Mental Growth; (3) The Relation Between Physical and Mental Growth. The conclusions reached by the investigators are quoted below.

"There are striking variations in the growth curves of superior and average boys and girls. Superior and average children develop at different levels and, with increase in chronological age, grow increasingly dissimilar in mental age. This divergence in the growth curves has long been assumed as probable, but has not hertofore been empirically demonstrated.

An analysis of the mental growth curve reveals a significant change in the trend with the approach of adolescence, which appears earlier in the case of superior children. There is also an adolescent superiority of girls which is in accordance with other facts indicative of the earlier maturity of girls. The mental growth curves are strikingly similar to the typical curves in height.

I. Q. curves are approximately horizontal, confirming, within limitations, the constancy of the I. Q. in successive examinations. The individual status of children at later ages can be predicted with considerable accuracy from an examination made four years previously. There is a similarity in the mental growth curves of brothers and sisters as there is also in their physical development.

Careful measurements of the height and weight of all the children were available as well as X-ray photographs of the wrist bones, a criterion of physiological development. Considerable resemblance was also found to exist between the physical and mental standing of children, the physially superior children being as a rule mentally advanced.

Further work is in progress at the Research Station to develop new methods of measuring mental growth. The results of this study will have direct application to the classifying and grading of pupils in schools. New light thrown on the stability of the I. Q. and the effects of practice will insure a more cautious use of intelligence tests as criteria of mental development. The study will give a decided impetus to research based on successive examinations of the same group of children, and will stimulate further investigations on the relation between mental and physical growth, especially during adolescence.

Book Reviews

BUSINESS ADMINISTRATION

By Leon Carroll Marshall. The University of Chicago Press. December, 1921. xxiv + 919

REVIEWED BY C. S. YOAKUM

The director of personnel who takes his task seriously finds his special field inextricably interwoven by the many other problems raised in the management of business enterprises. A peculiar task is his. If he be of the right sort, no man long conceals his deepest problems from the personnel director. He cannot avoid the necessity of discussing all problems in some way if he hopes to come at the solution of human problems. In industry, in business, the experience of the specialist in personnel makes it peculiarly his task to know accurately that bit of business theory that most concerns his employer. Fortunately, he is justified and respected if he claims no great knowledge in fields other than his own. That minimum of information concerning business administration, carefully systematized, has been placed at his disposal in this volume. Though supplying that minimum of general business information needed by the personnel man, Professor Marshall has not had this problem directly in mind. He says: "Collegiate training for business administration is now so widely attempted that the time has arrived when experiments should be conducted looking toward the organization of the business curriculum into a coherent whole. Training in scattered 'business subjects' was defensible enough in the earlier days of collegiate business training, but such a method cannot be permanent. It must yield to a more comprehensive organization." (p. vii). Among the basic elements of the business curriculum Such as production, finance, marketing, etc., we note, control of problems of personnel subdivided into (a) the position of the worker in modern industrial society (b) the manager's administration of personnel, and problems of adjustment to social environment (p. viii). Professor Marshall calls attention to the fact that this book is used as a beginner's course and is paralleled by another course dealing with the physical environment of business and follows still another which considers social environment. In the plan of presentation the book gives first a general view of the field of study and presents a functional approach to the field. The second part examines in some detail a single problem—that of plant location —to give the student confidence in analysis and to indicate the interdependent nature of the work of the administrator. The third part deals with the various functions of the administrator in some detail. The fourth part presents a 'business case' for the student to analyze. The main headings of chapters 3–9 inclusive will indicate the nature of the administrative functions dealt with. These chapters deal with the administration of personnel, of market problems, of finance, of production, of risk-bearing, and in chapters 8-9 are discussed the form of the business unit and basic features of administration.

Two arguments are noted in the discussion of the statement that "The manager's administration of his personnel problems is a topic which may rightly lay claim to much space in our treatment of managerial control." The first argument mentioned is "that attention to personnel

problems in modern industry is justified as a means of improving human relationships; as a means of producing *man*." The second argument is "that it pays; that it yields gains over and above the cost; and that the manager should therefore engage in personnel activities as a business proposition." The method used in examining these two arguments assumes, for facilitating discussion, the existence of a personnel department and attempts to examine the "larger problems which are to be solved and the material which are available for their solution." To quote the author on pages 116 and 117, "Section A (pp. 115–126) of our study will be devoted to a general view of the functions performed by the modern personnel department and of the functionaries who do the work. The purpose of this section is that of introducing the student to the subject-matter of the chapter in such a way that he may from the beginning think of it as a whole and not as a series of isolated sections. Sections B (pp. 127–163) and C (pp. 153–192) view personnel activities in terms of incentive and output, thus recognizing the challenge of 'does it pay?' Section D (pp. 192–226) gives us a glimpse of certain materials which are available for the solution of personnel problems. It emphasizes those aids which objectify the issues and facilitate scientific approach to the problems. Section E (pp. 226–242) discusses the place of the personnel department in the business organization as a whole." Sections B and C of chapter 3 which are described as recognizing the challenge of "does it pay?" cover mainly the physical phases of work and money forms of incentives to increased output. The general attitude maintained between labor and capital is also discussed. "It is the point of view of this chapter (as a whole) that the personnel manager, maintaining always his responsibility for broad social values, must justify his position in the business firm by his contribution to output" (p. 29). This viewpoint, which is also the general point of view of the book as a whole gives us the principal criterion by which the author measures business success. True it is no single measure such as the difference between 5 per cent and 6 per cent net profit, nor does any theory expect private concerns to continue without net profit; but the more inclusive glimpse of a situation in which the "pecuniarily organized scheme" is subservient to "life itself in its motives, aspirations, and social obligations" described in the preface (p. vii), disappears in the chapters that follow. The so-called intangible factors become secondary. Two ways out suggest themselves: the reconstruction of administration to produce men (see p. 115) as its primary objective or frankly to recognize man as a "machine" and to study this machine thoroughly so that its varied factors of efficiency in operation may be properly enmeshed in the present structure of business. A glance at our present quota of books on industrial management, on finance, on production, etc., shows us that none of the three viewpoints suggested above has full control. E. D. Jones in "The Administration of Industrial Enterprises," says (p. 18). "The ultimate administrative problem of socialized production is the handling of the human stuff." Scott and Hayes, "Science and common sense in working with men," affirm (p. 4) that "The idea of modern personnel administration can be summed up in four words: know your men better." And again in closing forecast that "When management comes to realize that labor is not a compact mass from which it indiscriminately clips off blocks to fill its gaps, but that it is rather an aggregate of disparate, distinct, and ever-changing individuals, it may come to devote the time and effort necessary for an adequate adjustment, and for its own ultimate salvation." Notwithstanding the practical necessity of appreciating modern business administration as it now is rather than as possibly partizan protagonists would have it, Professor Marshall has assigned 128 pages of his book to this discussion of personnel administration. But two other chapters, those on market problems and finance, exceed it in length. In addition to this noteworthy emphasis on a barely arrived separate function in administration, some 72 pages in other sections are devoted to such problems as technical education and the transfer of skill from the man to the machine (p. 543 ff.); scientific

management (p. 608 ff.); the significance of the human equation in business problems and the formation of judgments (p. 649 ff.); entrepreneurship and administrative qualties (p. 667 ff.); the mental aspects of administration and an analysis of "business judgment" (p. 764 ff.); the nature of qualities involved in administrative ability (p. 794 ff.).

The technical details of personnel management are not discussed (p. 116). In this review we have not attempted to cover the contents of the book. In opening we stated that it offers that general survey of business and its interrelations which is so important to the personnel administrator. Like the preceding books of its type issued from the various departments of commerce, economics, sociology, etc., of the University of Chicago, it aims to present a plan and to fit into that plan the most pertinent of the literature published. This volume and the "Readings in Industrial Society" published also by the University of Chicago Press in 1918 should be in the library of all those administrators who appreciate the magnitude of their task. To all others, whether administrators or merely seeking to understand in some small part the complexities of modern business, we commend an investigation of the contents of these volumes.

THE GANTT CHART: A WORKING TOOL OF MANAGEMENT

By Wallace Clark. The Ronald Press, New York, 1922. 155 pp.

Reviewed by F. E. Schuchman

"It aint so much the ignorance, as knowing so many things that aint so," said Josh Billings in speaking of people in general. And by the same token industry may be criticized. But in these days of restricted production the man who directs office or shop activities has the time and inclination to plan for the good times just ahead of us and so will welcome the few brief comments concerning a method for removing some of the uncertainties of business.

Probably the most outstanding feature of the Gantt Chart aside from its simplicity to prepare and apply is its breadth of application. Note the Chapter Headings—"The Machine Record Chart, the Man Record Chart, the Layout Chart, the Load Chart, the Progress Chart in the Office Foundry, Sales Department," etc. Whether your function is to get the greatest possible effectiveness out of a battery of drop forges or to visualize the output of a bevy of typists, you will find your needs anticipated in a series of charts with comments made easily accessible by means of a "List of illustrations." In fact, forty-three illustrations (mostly full-page charts) attest the faith which Mr. Clark, the author, has in visual methods of presentation of facts.

But just what is a Gantt Chart? In just what way is it different from the charts which we have been accustomed to see you use? In the preface we learn that the Gantt Chart is a method for presenting the facts in any situation so that they will be understood in their relationship to time, and in the first chapter the writer states that this feature is the *most notable contribution to the art of management made in this generation.*

In a Gantt chart equal divisions of space on a single horizontal line represent at the same time:

1. Equal divisions of time.
2. Varying amounts of work scheduled.
3. Varying amounts of work done.

Thus it shows the relationship of time spent to work done.

Although the Gantt Charts were applied very widely during the war, and the inventor (though he did not patent them) Mr. H. L. Gantt was cited repeatedly for his contribution to the management of war products, their greatest service is destined to be in the field of industrial production and to the following general classes of application.

1. Man and Machine Record Charts.
2. Layout and Load Charts.
3. Progress Charts.

In writing this short and concisely worded book, Mr. Clark, and his co-workers, Messrs. Tribold and Polakov, have given to industry a tool which will, if used, remove the element of uncertainty which has led many managers to draw their conclusions from too few instances, or fail to draw them at all. On the other hand, they have paid their debt of gratitude to an industrial benefactor, Mr. H. S. Gantt, who died in 1919, in a perpetuating contribution to his memory.

INDUSTRIAL ADMINISTRATION (A SERIES OF LECTURES)

By B. S. Rowntree and others. Manchester University Press (Longmans Green and Co.) 1920

REVIEWED BY A. T. POFFENBERGER

The industrial problems which England has faced since the war may be unique in some respects, but in the main they are identical with American problems. These problems are primarily concerned with the changing status of labor and the obligations of industry to labor. This book, comprising a series of eight lectures delivered in the Department of Industrial Administration in the College of Technology, Manchester, during the Session 1918–1919, throws an interesting light on proposed methods of meeting the obligations of industry to labor in England. That England is alive to the magnitude and importance of the task is clear from the activity of numerous organizations and the mass of literature on the subject which that country is producing.

In the first lecture by B. S. Rowntree, three conditions are cited which every industry must satisfy, namely, (1) The product of the industry must be of service to the community. (2) It must be produced under good conditions, and (3) It must sell at a reasonable price. It is the second of these conditions with which all of the lectures in this volume are mainly concerned. According to Rowntree, good working conditions imply good wages with a safe minimum wage, short working hours, and permanence of employment. These, and especially the first, are discussed in some detail. The following passage should be of interest to the student of industrial problems who is familiar with intelligence statistics: "We want them (the workers) to make the most of their brains, to utilize their spare time in self improvement and in the study of social and political problems. But is it reasonable to ask a man who has left home at five in the morning and does not return until six at night, to turn out after tea to attend a class, or to grapple with some serious subject? Shorter hours are simply essential if we are to have an educated democracy."

The second lecture by T. H. Pear outlines some problems with which the psychologist is especially trained to deal. These are of two sorts, employee selection and determination of efficient methods of work. Selection on the basis of natural capacity is proposed and illustrated with a few simple tests. Motion and fatigue studies are said to form the basis for proper work methods.

A. E. Berriman would make Education a fundamental function of industry and would have a specialist in Education on the management staff. This educator to be called an "Apprentice Master" would occupy somewhat the position of a personnel manager, but with much wider paternalistic powers. As the name Apprentice Master implies, the plan calls for a revival of the apprentice system of training, of a character and duration to fit the capacity of the individual worker. Charts are presented to show the path followed by various types of apprentices from the age of ten to that of twenty five years, and from the elementary schools through the university and professional schools.

T. M. Legge discusses occupational diseases and their prevention in the light of

England's experience in war industries. Factory ventilating systems and arrangements for the comfort and cleanliness of the workers play a large part in disease prevention.

Leonard Hill describes his method of measuring atmospheric conditions by means of the kata-thermometer, a device which records cooling power of the air through convection, radiation and evaporation. He gives charts and tables showing optimum temperature and humidity conditions for various kinds of work.

T. B. Johnson outlines the history of various movements to establish better relations between capital and labor and suggests several alternatives for the organization of industrial councils. To him the most promising scheme is the national organization of each major industry separately, both on the part of manufacturer and the worker. The State will then grant charters to these organizations guaranteeing certain rights and entailing certain obligations, such as the publication of cost, selling price and wage data. Industrial councils would then be formed from an equal number of manufacturers and workers from these organizations, and representatives of the State.

St. George Heath explains the need for a specially trained factory administrator, whose function would be somewhat like the industrial engineer in this country. Two plans for such training in the universities are outlined, one covering three years and the other covering one year. Three types of subject-matter, Industrial History, Economics and Ethics form the bulk of either course. These three divisions of work are discussed in detail and the different subjects to be included under each are described. He finds that many of the courses for the three year program are already being given in some of the larger institutions and need only to be properly grouped. Practically nothing has been done toward developing a one year course of training in any of the institutions.

A. F. S. Kent presents a simple exposition of the mechanism and causes of fatigue, and makes application especially to the practical problem of length of working day in industry.

The book taken as a whole offers a stimulating survey of English problems as the Englishman sees them, and may be read with profit both by the student and the specialist in problems of industrial administration.

THE IRON MAN IN INDUSTRY

By Arthur Pound. The Atlantic Monthly Press

REVIEWED BY P. E. WAKEFIELD

The author presents an interesting discussion of the influence upon society of automatic machinery and the automatization of industrial processes. The principal effects, according to the author, are a more fluid supply of labor; a general leveling of wages; mental atrophy and discontent upon the part of the workmen; greater concentration of leadership and power; an acute problem of balanced relationship between the state and those who possess this concentrated power; and acceleration of the economic developments leading to war; an aid to the survival of the unfit with consequent degeneration of the race. That the effects of automatization are far reaching and complicated no one will deny. Remedies for the undesirable effects are discussed throughout the book, but the author seems to stress more than anything else, the importance of cultural education that the worker may more profitably use the greater leisure which automatization has brought him. The book warrants more than a single reading, but the most careful study of Mr. Pound's discussion will hardly remove the impression of a large body of statement and conclusions resting upon a very narrow base. If automatization of industry were as general as it would appear from the impressions gathered in reading this book, it is possible that the

array of undesirable consequences mentioned, ranging from international war to female delinquency, might be correctly ascribed to this one underlying cause—the automatic machine. It is to be feared, however, that the author has written from a single viewpoint with the consequent loss of value that always attends a lack of perspective. One cannot help thinking that perhaps more acceptable conclusions could be arrived at if the discussion of the effects of automatic machinery included not only those that are undesirable but those that are desirable as well. In his chapter on "Education for Leisure," the author presumes to state in two paragraphs the problems of modern education, and then with delightful assurance assumes that the "experts" (who we are to understand have heretofore been in total darkness as to the nature of the problems confronting them) will now proceed to the details of their solution. Would that all of our problems of education might be so simply and easily disposed of.

TIME STUDY AND JOB ANALYSIS

By Wm. O. Lichtner, New York, 1921, Ronald Press Co. pp. 397

REVIEWED BY EUGENE I. BENGE

Many elements of this book represent distinct contributions to the field of management. The author's style is so readable that one can overlook the occasional repetition. There is no attempt to impress the reader with the feeling that time study delves into mysterious depths before which the lay mind must stand in awe. Rather does the author try to show that standardization represents common sense expressed in minutes.

There are certain features of Mr. Lichtner's book which are particularly worthy of attention. He does not merely tell how job standardization *should* be accomplished, but he also cites numerous examples in detail. In outlining methods of training personnel to carry on the work of standardization, he has supplied a program for the extension of this developing field. The author wisely stresses the necessity of making certain that standard times, once set, are actually attained.

It is to be regretted that, at a time when committees from various societies are attempting to standardize the terminology of management, the author should have used the term "job analysis." The field of personnel has already filed a *caveat* on this phrase, and uses it in a different sense.

The material of the book is logical, and well organized. The numerous sub-headings would make it acceptable as a text-book. Because of its very nature, the author's message is addressed more to superintendents of production than to other executives. There is little doubt, however, that anyone interested in industrial progress will derive considerable benefit from a careful study of *Time Study and Job Analysis*.

MIND AND WORK: THE PSYCHOLOGICAL FACTORS IN INDUSTRY AND COMMERCE

By Charles S. Myers. G. P. Putman's Sons, New York and London, 1921. Pp. xi + 171

REVIEWED BY MISS GLADYS BOONE

Dr. Myers holds that "of the four main determinants of industrial and commercial efficiency—the mechanical, the physiological, the psychological and the social and economic—the psychological is by far the most important and fundamental," and

this series of lectures is devoted to showing its importance in movement study, fatigue study, selection study, incentives study and industrial unrest. This wide range of subjects is covered in the small compass of 171 pages, so that this book is not one to which the student can turn for a discussion of the technique of making time and motion studies or of the reliability of selection tests. Dr. Myers' purpose is not to write a text-book for the psychological investigator but to suggest the peculiar psychological problems which modern industry and commerce must face and to show the need for the work of a National Institute of Psychology and Physiology applied to Industry and Commerce. Such an Institute was founded in London in 1921 and Dr. Myers is now its Director.

The argument of the book flows smoothly, frequent examples arouse interest and in general Dr. Myers avoids the pitfalls of broad generalization which yawn for the author of a brief volume covering a wide field. There are, however, occasional lapses into sweeping characterizations. For instance, in the chapter on selection study, when discussing the psychological investigation of reaction times, he arbitrarily divides persons into the "quicker, less reliable, so-called 'muscular' type attending predominantly to the movement by which they had to react, and the "slower, more reliable, sensorial type, attending predominantly to the signal which they were expecting to receive."

The author draws quite largely on American sources, especially for technical methods in the field of motion study and tests in selection. For most of his illustrations he is indebted to the Gilbreths. To American readers the chief interest of the book should lie in the point of view from which Dr. Myers approaches the whole subject which we broadly term "Scientific Management." He has an unusual appreciation of the workers' problems and point of view, understands thoroughly their revolt against early American methods of Scientific Management and is convinced of the necessity of full co-operation of workers and management in running the industry and commerce of the future. Without this cooperation management could not be scientific in any true sense of the word, because it would be based on incomplete knowledge. Dr. Myers believes that problems of vocational selection, movement study and training will be infinitely simplified when the workers are relieved from the fear of unemployment and when they can assume some share of responsibility in management. Then they will no longer be forced into defence policies which obstruct production and there will be more incentive to join in research on managerial problems.

The author has no use for either the employee or the employer who resists the onward march of science in industry merely on grounds of prejudice or because of inertia. After characterizing the foreman "who is suspicious of higher ability among those under his charge" and the "employer who prefers to be ruled by guesswork and intuition or by the long and wasteful process of trial and error" as types of men who are opposed to the introduction of the systematic methods of science, he sarcastically remarks "Vocational Guidance and Vocational Science have, therefore, a brilliant future before them."

We commend the book to the progressive executive and to the trade-union leader who want to face the psychological problems of our modern industrial organization. The student who is entering the field of industrial psychology will find it stimulating in its point of view and scientific in its avoidance of dogmatism.

MERCHANDISING STUDIES OF THE STATES

By Archer Wall Douglas. New York, The Ronald Press, 1920. Pp. iv + 178

REVIEWED BY C. F. HANSEN

The purpose of this volume, as stated in the introduction, is "to set forth the story of certain states, as types of those studies in the development of the country that must be part of the policy of every great organization which seeks to found its business upon intelligent study of the possibilities and likelihoods of the future." The method of investigation followed consists of a broad survey of the following "representative states": Ohio, representing the older Middle West; Wisconsin, the northern Middle West; Arkansas, the Southwest and the central South; North Carolina, the more southern Atlantic states; Kansas, the western plains; Texas, the southern plains; Colorado, the mountains; and California, the Pacific Coast. The oldest sections of the country are omitted, in these surveys, because they had, to a considerable extent, already established their individual state "patterns" before the past quarter century. The volume is limited to a survey of developments within that period, and the states selected passed through large and significant changes in that time.

The means utilized in carrying out these surveys of states are professedly empirical: "Facts must first be obtained with the theory following as the natural consequence of intelligent and unbiased study of the facts" (p. 13). Recourse is therefore had to such sources of facts as the following: historical and descriptive books, governmental or private reports dealing with the topography, geology and climate of the region, its natural resources, and their industrial and commercial development; status of education and expenditures therefor. Particular emphasis is laid on personal observation by tours and visits, by interviews with "natives" and business leaders. Traveling over the state is also emphasized.

The individual accounts of the representative states are bristling with observations and facts derived from these various sources. An exceedingly attractive style adds to the interest of the volume. Simplicity of statement and clearness are particular virtues. The breadth of view is admirable.

As "Merchandising Studies of the States," however, the book goes wide of the mark. The marketing of goods or the establishing of policies for trade and manufacture in the various states can derive only vague benefit from this treatise. The book is manifestly so broad in its materials that it can be used only as a shot-gun to sprinkle the territories with a shower of ideas, rather than as a rifle to bring down precise results. When a business man is making first acquaintance with particular states, he can well read about such surveys in order to secure an impression. But when he gets ready to sell plows or neckties he will be faced by glittering generalities and opinions which fall short of the specific aid commonly given by advertising and marketing concerns.

An interesting feature of the book is the emphasis laid upon the "spirit of the people." Those who have wrestled with statistics will readily, on the basis of their own experience, agree with the stress laid on the imponderable psychological factors, but they will not necessarily accept the statistical agnosticism implied by the general treatment.

THE PSYCHOLOGY OF INDUSTRY

By James Drever, M.A., B.Sc., D.Phil. E. P. Dutton, 1921. Pp. vii + 147

Reviewed by Henry C. Link

This book of less than one hundred and fifty pages, capitalizes a hope rather than an achievement. The author begins with the statement that his book "is intended not so much for the student of psychology as for the ordinary man." This indicates his purpose to write in a popular style. Now a science lends itself to popularization best at two stages, first, when its technical aspect and technique are so undeveloped that all kinds of general statements may be made about it; second, when its technique and scientific achievement have become such that it is necessary to simplify and interpret them if the public is to understand them. Industrial psychology as a science is much nearer the first stage than the second, and consequently, as one might expect, any book written on that subject today is likely to be highly superficial and tentative in character.

Since this must of necessity be so, the least which we have a right to expect in a book of this kind is an intelligent evaluation of the results of the experiments which have already been made, and a discriminative outline of the paths which industrial psychologists may find most fruitful in the future. In both of these respects Drever's book is conspicuously lacking. For example, in his chapter "The Vocational Fitness of the Worker" Drever described the simple reaction test with the use of the Chronoscope as one of the tests which may be used for determining vocational fitness. As far as I know, nearly every experiment with simple reaction tests under industrial conditions has led to the conclusion that such a test gives no indication whatsoever of vocational fitness and that it is necessary to take a more complicated coördinated group of reactions before such an indication could be found. Moreover, this chapter adduces as evidence the reaction test described in Taylor's book on scientific management, an experiment which, to be sure, has been mentioned by a number of other psychologists who are more strongly influenced by the desire to believe than the desire to know. The authenticity of this experiment is, on the face of it, open to question but it has remained for the English psychologist, B. Muscio, to show conclusively that this bit of evidence psychologists will do well to forget in their future references to the achievements of industrial psychology. If Drever's purpose was to discuss psychology for the benefit of the layman, he does not achieve it by repeating a myth which has already been too highly popularized.

The chapter on Fatigue contains a statement to the effect that in using output as a criterion of fatigue we must discount the other factors upon which output depends. In the light of this statement, some of the examples of variations in output due to shorter or longer hours, given in the following chapter on "Work and Rest Periods" (notably on pages 78 and 79) are nothing short of ridiculous. The example cited from the writings of Sir Stanley Kent, a physicist whose studies in industrial fatigue are notorious for their scientific inconclusiveness, shows that the output of one woman who insisted that she could do more work in eight hours than in twelve was much greater than the output of three expert workers who worked for ten and twelve hours a day. The inference is that the eight hour day is more productive than the ten or twelve hour day, an inference which is obviously unscientific. And yet, the writer concludes from this and other incidents almost as inconclusive: "These facts speak for themselves, and the confirmation they give to experimental results obtained in the laboratory is absolute." Evidently, the writer is not aware of the fact that the whole question of fatigue, both from an industrial and a psychological point of view, is absolutely 'up in the air

The beautiful studies made in the field of fatigue by the author's compatriot, Bernard Muscio should have given him at least an inkling that this was the case. Certainly, the author is right when he says in this connection: "Here once more is work waiting for the new profession of 'psychologist.'"

Just one more example. After an equally uncritical discussion of experiments in advertising, the author goes on to say: "These investigations have been cited at length not merely for the results obtained, but also to show how readily the problems of advertising lend themselves to experimental treatment under laboratory conditions. It would be quite as easy . . . ," etc. The American investigators whose work in advertising the author quotes at length know only too well the many serious difficulties that beset any study in the psychology of advertising, and the meagerness of the results hitherto obtained.

This review has not dealt with an outline of the contents of Drever's book since it is considered more important to give a critical indication of how it does what it does. The author has been very liberal in his references to the work of American investigators, more liberal than critical. On the other hand, he has completely ignored the contributions made by German and French psychologists.

It is to be hoped that the next book written on this subject will be influenced a little less by the wish to believe and a good deal more by the passion for scientific facts. Even in a book for laymen the scientific imagination is to be preferred to the journalistic imagination.

WOMEN IN CHEMISTRY: A STUDY IN PROFESSIONAL OPPORTUNITIES

New York. Bureau of Vocational Information, Studies in Occupations, No. 4, 1922. Pp. xiii + 272

Reviewed by Isadore B. Whitley

This very interesting and comprehensive bulletin has been compiled by The Bureau of Vocational Information, New York, for the information of college women when they ask the question phrased by Dr. Charles H. Herty: "If I should choose to make chemistry my life work, what are the fields open to me, what further preparation shall I need, and what are the opportunities for success and advancement?"

The bulletin contains the results of a scientifically conducted survey into the field of chemistry and the allied fields of bacteriology and physiology, from the standpoint of their desirability as occupations for college women. The sources of information as listed in the introduction are illuminating as indicative of the infinite amount of care taken to make the study authoritative and helpful. Two-hundred and eighty-six women chemists in educational institutions, medical laboratories, industrial laboratories, government laboratories, the allied fields, and miscellaneous fields, were consulted by interview and questionnaire. Information as to additional women chemists to the number of 368 was obtained from university departments, scientific journals, scientific societies, and fellow chemists. Information with regard to women chemists in industry was obtained from 191 chemists and executives, and a great mass of further detail from organizations, medical laboratories, and universities. The geographic distribution of this information was wide enough to make the facts presented representative of general conditions.

Although women are not newcomers in chemistry, their number is still small, probably about 4 to 5 per cent of the total number of chemists, yet the number of women who are forsaking the muffin-pan for retorts and test-tubes, the cook-stove for a Bunsen burner, and sugar and spices for less fragrant chemical reagents, is an ever-increasing one, and the bulletin presents an amazingly large number of attrac-

tive possibilities for such women. In presenting chemistry as a desirable vocation, the statement is made that "The future development of American industry is intimately bound up in a proper supply of *adequately trained* chemists," and this need for adequate and thorough going training is continuously stressed throughout the succeeding pages.

The organization of the bulletin is admirable. The first part considers chemistry as a vocation, the second part consists of a detailed analysis of positions in chemistry in educational institutions, in laboratories for medical and related analysis and research, in industrial laboratories, in government laboratories, in the related fields of pharmacy, microscopy, metallurgy dietetics, etc. The third part of the book considers the all-important problem of training, including both undergraduate and graduate preparation. The fourth section is devoted to such practical vocational considerations as the numerical importance of the vocation, the advantages and limitations of chemistry as a career for women, the qualifications required in the way of health, personality, etc., the salaries obtainable, and the means of securing positions.

Investigation on the part of those interested in taking up this work is further facilitated by a conveniently arranged appendix which lists the schools in which women may secure graduate training in chemistry, the prizes and grants, fellowships and graduate scholarships available, the scientific and technical publications of interest to chemists, and the scientific societies open to chemists.

The content and organization of "Women in Chemistry" is so vital and lucid that it should prove of interest to all college women who are faced with the necessity of choosing a vocation, and should prove a decided stimulus to entrants into this fascinating realm of chemistry. Judged merely as general reading, the bulletin is full of interest; as a guide to the prospective women chemist, it is invaluable.

ANALYSIS AND CLASSIFICATION OF PERFORMANCE IN VOCATIONAL RELATIONS

By J. Osborne Hopwood, M.S. (Yale). The Gorham Press, Boston, 1922. 128 pp. Price $1.75

REVIEWED BY RICHARD S. UHRBROCK

This book will be of little help to the beginner in the fields of personnel relations or vocational guidance. It lacks a definite, specific objective. It can be characterized as a collection of notes, loosely related to the problems of job analysis and vocational placement. In some instances the reader is told *what* to do, but rarely is he told *how* to carry out a program. The whole volume is lacking in concrete illustrative material. It is evident that the author has neglected to outline his material carefully, for he has failed to present his thoughts in an orderly and straightforward manner. He indulges in sentences of undue length and thereby obscures his meaning to such an extent that the average reader gives up in despair. A thirteen line sentence is in the preface, and one of eleven lines appears on page 37.

An attempt has been made to compress too much into too little space. One cannot do justice to such a subject as "The Nature of Performance" in nine pages. An adequate treatment of "correlated acts ranging from the simplest 'Reflexes' to 'Rational Acts'" is worthy of an entire volume and years of of patient effort. Also, it is doubtful if the "instinct of progress" postulated on page 95 really is valid. The importance of objective criteria in measuring such qualities as observation, tact, poise, self-reliance, etc., is not always emphasized. Even though the technique for measuring such qualities has not been perfected in all cases, the need for such procedure should be insisted upon in a book of this kind. This volume shows evidence of much thought and contains a carefully compiled index.

INTRODUCTION TO THE USE OF STANDARD TESTS

By Sidney L. Pressey and Luella Cole Pressey. The World Book Company, 1922, vi + 263 pp.

REVIEWED BY MARION A. BILLS

This book gives a very sane though elementary discussion of the use of tests in schools. It is written primarily for the teachers, principals and superintendents of secondary and high schools. One fundamental idea runs throughout the entire book and is illustrated and ramified on every page, i.e., the chief purpose of tests is diagnostic and their use for this purpose should lead to better teaching. This idea while perfectly familiar to those scientifically engaged in testing has not previously been sufficiently emphasized to the layman. And if the book, as the authors hope, decreases the number of test records gotten and never used, it will prove of value.

In the first part the authors discuss the general principles of what tests to use, how to give them, and methods of handling the results to get the most practical information from them. It is very sanely written in that it does not advocate tests as a panacea for all ills, but frankly states their uses and misuses. It is very clearly written and no teachers when they finish reading should have any doubt of the viewpoint of the authors. At times one feels it is almost too clearly written as when on page 44, four lines are taken to teach us to add to forty one.

Parts 2 and 3 discuss in detail "school subject" tests and "mental ability" tests, following up the general ideas expressed in part 1.

The first chapter in part 4 discusses how to make a test. The stated object of the chapter is to give a back ground to the user of tests, as such it is wholly inadequate and one cannot but wish that there was either more or less of it.

The last two chapters give an excellent discussion of methods of laying out a comprehensive test program in a school system, and would if taken to heart by superintendents, give us a testing regime equalled at present by few schools.

PRINCIPLES OF THE NEW ECONOMICS

By Lionel D. Edie. New York, Thomas Y. Crowell Company, 1922, xiii + 525 pp.

REVIEWED BY H. G. KENAGY

Students of modern economic problems—particularly those who have been seeking an organized presentation of these problems in terms of their human elements—will find Professor Edie's "Principles of the New Economics" a highly satisfactory and exceedingly useful volume. Mr. Edie establishes and successfully maintains the fact the ecnomics is a human science, that it is based primarily upon human desires, motives, habits, and instinctive tendencies, and that, therefore, its development must begin with a thorough understanding of human psychology. Teachers of economics as contrasted with authors of text-books on economics, have long accepted this point of view, and various writers have attempted applications of psychology to particular problems. It has remained for Professor Edie, however, to present in systematic fashion a general survey of economic facts and principles in terms of their psychological and social aspects.

Perhaps a few theoretical psychologists will quarrel with Professor Edie's treatment of some psychological concepts. The author certainly leans hard upon those psychologists whose treatment of certain concepts lends itself most readily to practical application. But, being an economist and not

a psychologist, Professor Edie has a right to follow the lead of any reputable group of social psychologists. In accepting the leadership of McDougall, Cooley, Trotter, Wells, Wallas, Veblen, Cannon and others of their kind, he is supporting a point of view which is more widely accepted than any other at the present time. He does not attempt to build his psychological interpretations and applications of economic facts upon the controversial ground of the elements of man's original tendencies, but prefers instead the concept *disposition*. "For the purposes of economic psychology it is commonly more serviceable to think in terms of the whole dispositions. . . . . The important conception . . . . . is the whole process, perceptual, emotional, and energizing or impulsive, because the whole process is the determining factor in social and economic behavior" (p. 6).

In his opening chapter, the author puts upon economic psychology a burden which it ought not to bear and which it cannot bear if it makes claim to being a science. At the top of page 2 we find psychology called upon to answer the question: "Why do men behave in the business world as they do? Do these forms of behavior make for the *proper amount of satisfaction and welfare*?"[1] Neither psychology or economics—not even sociology—has any concern, as a science, with what is right or proper. Because the author has allowed himself in some parts of the book to be a judge and an advocate, his work loses to some extent its value as a scientific treatise.

A glance through the table of contents seems to indicate that Professor Edie has merely prefaced the usual treatment of "the wealth getting and wealth using activities of man" with a short discussion of some general facts of social psychology. But examination of the book shows this is not the case. Part I does outline the principle of economic psychology, but these principles are drawn upon constantly throughout the remainder of the work, as much to explain the price system and business cycles as to make clear the meaning of radicalism. Part I might be left out altogether if all students of economics were as well grounded in psychology as they ought to be.

The book as a whole is a clear cut challenge to economists to bury forever the old "economic man" and to put in his place the *human* man which our modern psychologists are learning to describe. The "economics student must come to look upon his fellowmen engaged in all the different activities . . . . not as pure rationalists . . . . but as men who are expressing all their instincts in greatly varying degrees and with all sorts of intensities" (p. 32). Throughout the volume the author remains true to this point of view. For example, in discussing the problem of wages (Chapter VI), Professor Edie does not stop with an explanation of the various wage theories. After showing the inadequacy of the subsistence, wages fund, commodity, and productivity theories, he proceeds to develop a pluralistic theory which takes into consideration such factors as cost of living, *incentives*, bargaining power, *habits and customs*.

In his discussion of human adaptation to the economic environment, which he makes a primary problem of economics, the author shows the need for a new conception of economics. Not discarding the laws and principles which traditionally enter into economic thinking, he adds to them a study of "the imponderables of human nature,—of the motives, emotions, thoughts and satisfactions of men engaged in earning and spending an income. . . . . Laws, principles, statistics all require the vitalizing outlook of the psychology of men" (p. 69).

It is too much, perhaps to expect that a book which attempts an overhauling of economic thinking, should complete the work at the first attempt to the satisfaction of all. Many subjects commonly included in text books of economics are not touched upon at all. For example, under such headings as "Economic Adaptation," "Public Central," and "Economic Radicalism;" which are chapter headings in Part III, we might expect a discussion of

[1] Italics are the reviewer's.

Taxation, particularly the Single Tax. Inheritance taxes alone receive attention. In discussing management, the author points out the problems of personnel management but gives no attention to methods which have been developed for handling these problems. This seems strange in view of his previous declaration that progress in this century in economic development will be due more to an advance in our knowledge of personnel than to further increase in our knowledge of the material universe (Chapter II). Fairness compels us to note the deficiencies, but the criticism is motivated by a desire to have the entire field of economics treated by the author from the same point of view and in the same illuminating fashion.

Abstracts

Dividends of Safety. C. M. ANDERSON. "Milwaukee," February, 1922.

Figures from the Cutler-Hammer Manufacturing Company of Milwaukee prove that safety work in this plant has decreased the number of accidents, decreased the compensation payments necessitated, and has increased production to such an extent as to put safety work on a paying basis and make it a first class asset. Some of the methods used were the instruction of foreman through schools, the operation of a medical department to treat all injuries to employee and family, and the installation of proper guards for machines.

Tests for Clerical Occupations. CYRIL BURT. The Journal of the National Institute of Industrial Psychology, Vol. 1, January, 1922, and Vol. 1, No. 2, April, 1922.

Gives the method of developing and the results obtained from a series of tests for typists and shorthand writers. Preliminary tests were tried on a group of "experienced and intelligent" people and were modified according to their suggestions. The tests were then tried on a group of school children the degree of difficulty of the different items estimated and the correlations, of the tests with intelligence, found. They were then given to thirty typists in "an important office of a large educational authority." The tests given fall into the following classes: graded tests of intelligence, graded tests of educational attainments, tests of linguistic ability and general information, tests of typewriting and shorthand writing. The whole series requires about two hours. The thirty typists were ranked by the office supervisor on, general office efficiency; efficiency in typwriting; efficiency in shorthand. These ranks were correlated with ranks in the tests. The best correlation was found between the general intelligence test and general office efficiency (+ 79) the poorest between tests of typwriting and ratings, on typewriting (+60). The typists were divided into four groups as follows: excellent, good, tolerable, failures. Minimal standards of efficiency are possible for each group in each test.

Training for Thirty Years Ahead. R. P. CRAWFORD. Forbes, May 27, 1922. Vol. X, No. 4, p. 171.

An interview with Herman Schneider, Dean of the College of Engineering and Commerce, University of Cincinnati. Sixteen years ago Dean Schneider inaugurated the "Cincinnati plan" for engineering courses which permits students to spend one half of their time in shops and the other half in college. When the College of Commerce was merged with the College of Engineering two years ago, he applied the same principle to the commercial course, requiring part-time shop work the first two years and office work the last two. Dean Schneider believes that this general training is of primary importance and the construction of a curriculum which trains in accordance with the future trend of busines no less so. In "placing" his students he has found the performance of a man on the job together with a consideration of certain types of men to be the plan of most value. His types include among others, the following: a settled or roving disposition, manual or mental dexterity, physical strength or weakness, an indoor or an outdoor man. If a man is successful on a job it is assumed that he possesses the characteristics for that job. If he is not successful, an analysis is made to determine which of the characteristics he lacks. "None of the psychological tests have stood the test with us" is Dean Schneider's comment on the usefulness of tests.

Occupation Hazards and Diagnostic Signs. LOUIS J. DUBLIN, PH.D. AND PHILIP LEILOFF. Bulletin of the U. S. Bureau of Labor Statistics, No. 306, April, 1922.

Many occupations have injurious effects on the physical condition of those engaged in them. These effects give rise to cases which have often puzzled physicians to diagnose. Directing their attention to the occupation of a patient as a factor, has enabled industrial physicians more readily to help their patients.

There are nine major hazards of employment. These are:

Abnormalities of temperature
Compressed air
Dampness
Dust
Extreme light
Infections
Poor illumination
Repeated motion
Pressure or shock
Poisons

Long exposure to skin irritants often gives rise to forms of industrial sickness. To aid the physician in determining what irritant may be causing the trouble a list of occupations with their accmpanying irritants is furnished in the bulletin.

As a further aid to the physician, hazardous occupations are listed alphabetically in the bulletin. The hazards are each discussed separately in a second list which indicates the symptom and the occupations which offer such exposure.

By the use of the bulletin, a physician may, therefore, readily diagnose a case which might otherwise be puzzling.

How to Sit Comfortably at Work. ARTHUR B. EMMONS, M.D. Director Harvard Mercantile Health Work. Bull. Safety Institute of America, 1922, Vol. 9, pp. 87–91.

Gives explanation in simple language of correct sitting postures, points out obvious faults frequently observed, and applies the simple mechanical principles involved to industrial and mercantile needs. The fundamental rule for support and freedom of action is "Bend at the hips, never at the waist." The alteration room presents the most glaring examples of bad sitting posture. The marking room is nearly as bad. Stenographers are found on "adjustable but *not adjusted* chairs." Old fashioned ledger desks, stools with foot rungs attached are often found. The executive sits in a deep swiveled arm chair doubled forward over his desk. A work chair recently described best meets the needs of nearly all workers. Reference to its description is given. The following rules are given for adjusting chairs for new workers:

1. Start with the height of desk (usually 30 inches) or table. 2. Subtract the sitting height of the individual from this desk height to determine the height of the work chair seat. This may best be done by trying the worker in chairs of different height. 3. If the feet do not rest comfortably on the floor without the thighs resting heavily on the front of the chair seat, provide a foot rest or brace. Rarely is a foot rest satisfactory if attached to the chair. Usually it may be attached to the desk or table. 4. The light coming over the left shoulder is best for general work. Avoid light from directly in front, which reflects glare from the work, and also light from the right which casts the shadow of the hand on the work. Light from above is also excellent, especially if reflected from the ceiling, as in totally indirect lighting.

Faults of traditional seating are too often perpetuated by the manufacturer who makes his output conform to previous sales and by lack of interest in the subject in stores and industrial plants.

Development of Collective Bargaining in the Men's Clothing Industry in the United States. MARGARET GADSBY. Monthly Labor Review, June, 1922, pp. 1–16.

This article deals only with that part of the men's and boy's clothing industry organized by the Amalgamated Clothing Workers of America.

The development of collective bargaining in this industry is sketched by showing its development successively in the large clothes manufacturing centers of Chicago, New York, Boston, Philadelphia, Cleveland, Rochester, and Baltimore.

The provisions of renewed agreements in Chicago, Cleveland, Rochester, and Baltimore are summarized and presented in table form. One of the most interesting features of the agreements is the provision for the consideration of unemployment insurance. This is a provision of great interest to the workers since the industry is so seasonal.

A condensed history of the Amalgamated Clothing Workers of America is presented indicating its growth, its policies and the workers over whom it claims jurisdiction. The article concludes by briefly touching upon agreements in force in markets other than these presented in the table.

Serial Action As a Basic Measure of Motor Capacity. C. FREDERICK HANSEN. Psychological Monograph, 1922, Vol. XXXI, No. 1, pp. 320–382.

Discusses the importance of serial action as a basic measure of motor capacity. Skill in many vocations and avocations as music, stenography, telegraphy, and factory inspection of various kinds depend to a marked degree on proficiency in serial action, which is involved in any set of successive and corresponding reactions. Because the experience of daily life occurs in serial form, a laboratory test based on serial action should predict an individual's motor capacity better than any test based on simple reaction time. The author proposed, therefore, (1) to secure a simple and practical device for measuring speed and accuracy in a serial action; (2) to standardize thoroughly the variables in the procedure, thus leading to the gathering of reliable data; and, (3) to measure the performance in this test of certain representative groups of persons. An historical résumé of serial action and related experiments is given in detail and particular emphasis is laid on the objective and subjective conditions which may affect the time and character of serial actions.

The apparatus used in the present experiment consisted essentially of a commutator attached to a typewriter in such a way that each movement of a typewriter key completed one of four possible circuits, the order of appearance being determined by chance for a series of seventy-five reactions. The method consisted of the subject's placing the index and middle finger of each hand on one of the four keys respectively, and proceeding to make an unbroken series of "reactons after discrimination and choice" according to his particular problem. For example, the four keys, numbers 1, 2, 3, and 4, might be associated with tonal stimuli coming from four easily distinguishable directions, 1, 2, 3, and 4. The experimenter turns on the current causing a tone, say in direction number 2 and the subject must identify the location by pressing the corresponding key number 2. By the action of the typewriter carriage the commutator was moved forward a step and produced another signal which must be reacted to, and so on for the rest of the series. Time was recorded for each line, which consisted of seventy-five spaces. Visual stimuli consisting of four candelabra which had to be reacted to according to their serial position, digits, and visual stimuli consisting of the letter "E" turned in different positions, were used during the course of the experiment. The motor form of attention was emphasized throughout the test and the subject was kept informed as to his record and urged to do better.

To test the effects of practice upon performance in the test of serial action, three series of experiments were given. Series A consisted of the intensive investigation by Mr. H. R. Fossler of the effects of practice, using three university students as subjects. Each subject was given thirty trials a day, the series being alternated from visual to auditory stimuli every five trials. Subject A was given 28,120, Subject B 19,240, and Subject C 8,880 individual reactions. Series B consisted of tests given to twenty-six girl students in Northwestern University School of Music, by Dr. E. A. Gaw. On each of five days, at intervals of three to seven days, two sets of tests were given to each subject, the first set consisting of five trials with visual stimuli and the second of five trials with auditory stimuli. Series C was given to six men students and consisted of ten trials each, given on seven successive days, the stimuli being the candelabra lights. The general conclusions from this first set of experiments are as follows:

(1) With both kinds of stimuli, practice increases the speed and decreases the variability of the serial reaction. The greatest increase in speed occurs in the first twenty-five or thirty trials and then increases at a slower rate for an indefinite period.

(2) Unless a habit of accuracy is built up from the first trial, accuracy decreases with the increase of speed. The first part of each day's performance is more accurate than the last.

(3) Individual differences in speed and accuracy do not disappear with practice, though the diversity tends to decrease.

(4) The relative capacity of the subjects can be determined in five trials.

After this test series, the serial action test was given with a number of other tests to four classes of persons; (1) Students, (2) Army recruits, (3) Musicians, and (4) Stenographers. The median reaction time for the students (100 men and 52 women) was 56.4 seconds. Group A of the army recruits had a median of 73 seconds; Group B (60 men) had a speed in visual reaction of 63.9 seconds and Group C (70 recruits) had a median reaction time with the auditory stimulus of 60.9 seconds. The music students tested by Dr. E. A. Gaw gave a median of 51.5 seconds in visual and 64.8 seconds in auditory serial reaction. Sixty-three women, students in music at the University of Iowa showed scores with very short reaction times, a narrow range and few errors, the visual stimuli being used. Two groups of stenographers (137 in all), tested by Mr. Ben W. Robinson, were next highest to the superior music group. General conclusions for this set of experiments are:

(1) No consistent sex differences are shown either in speed or accuracy.

(2) Electric lights produced the quickest reactions, digits next, tones third, and visual symbols "E," last. Accuracy is slightly better with the visual tests.

(3) The medians show improvement in speed with each successive trial.

A study was made of errors in relation to the sequence of stimuli. It was found that the number of errors depended upon the probability of the appearance of each stimulus. The subject expected the stimulus which had been absent the longest and with this stimulus there was only 36 per cent of the errors, although its proportional share would be 57.5 per cent. The most recent stimulus on the other hand had 34 per cent of the errors while its proportional share would be only 17.3 per cent. The "hard" places in visual tests are also the "hard" places in the auditory tests.

Results in the serial action test were compared with other measures, with the following results:

(1) A low positive correlation is obtained between speed in serial action and the time of simple reaction to sound.

(2) No correlation was found between precision of movement as measured by the target test and speed of serial action.

(3) A low positive correlation between strength of movement as indicated by the Smedley dynamometer and serial action.

(4) Motility, measured by the maximum rate of tapping also showed a small positive correlation when compared with serial action speed.

(5) Code tests also indicate a tendency to agree with ratings given by the serial action test.

(6) No consistent relation was found between serial reaction and the Vasey vocabulary test.

(7) No definite relation was found between the serial action test and the army Alpha but the former did pick out with considerable certainty nervous, highstrung subjects.

(8) Ratings in musical ability showed that the serial action test indicated relative capacity for musical action. Data with regard to typists and telegraphers was insufficient to be conclusive. It was difficult to compare results with practical criteria because, (1) the test differed in amount of strain and pressure from vocational activities, (2) the experience and training of the subjects was very diverse, (3) even when the verbal instructions for a test are standardized, the experimenter plays a considerable part in the results and (4) the criteria used to gauge vocational success must be made more satisfactory.

The Practical Value of Scientific Study of Juvenile Delinquents. WILLIAM HEALY. U. S. Department of Labor, Bureau Publication No. 96, 1922, pp. 31.

Dr. Healy discusses (1) the purpose of the juvenile court, throwing great emphasis on the need of individualization both of understanding and treatment. The interest is in the offender not in the crime. He next formulates a series of principles to be used in the scientific study of delinquents. The mere classification by "intelligence levels" does not represent the whole individual. It is necessary to know "the individual's habit of mind, the forces which drive him, his motivating experiences, his reactions to his environment, his ideation as related to delinquency, causations in the environment itself, his special resources of mind and body that can be utilized for reeducative treatment."

The Problem of Dust Phthisis in the Granite Stone Industry. FREDERICK L. HOFFMAN. U. S. Bureau of Labor Statistics, Bulletin No. 293, May, 1922.

The death rate from pulmonary tuberculosis is so great among the granite stone workers that the subject demands the consideration of the State, the medical profession, and the labor organizations directly concerned.

The wage earners in the granite stone industry live under sanitary conditions above the average, their housing conditions are better than the average, and anthropometric records establish the fact that as a group they have disease resisting powers above the average. Their large death rate, therefore, can only be ascribed to conditions incident to their employment.

Considered by specific occupations, the granite workers show wide variation in the frequency of tuberculosis. The excess in death rate is most marked among the stone cutters who are most subject to dust exposure. A study of the occupations indicates that the tuberculosis risk is proportionate to the dust exposure.

The incidence of pulmonary tuberculosis is proportionate to trade life. The effect of dust inhalation increases in seriousness, producing a maximum effect at the end of 21 years. A serious feature of this situation is that within the last two years, compared to the normal death rate in New England, there has been an enormous increase in the death rate of the granite stone workers. In addition the mortality from bronchitis, pneumonia, etc. has been increasing.

The dust hazard depends upon the silicotic content of the dust inhaled. Workers in marble and limestone do not suffer from pulmonary tuberculosis to the extent that the granite workers do.

There seems to be reason to believe that since the disease depends upon the exposure to silicotic dust that it is not a form of tuberculosis, but a dust phthisis of non-tubercular origin, probably complicated in its terminal stage by superinduced tuberculosis.

If the disease is non-tubercular in origin and frequently non-tubercular in termination, it cannot be treated in the same manner as an ordinary case of tuberculosis. Further it cannot be infectious.

An investigation tends to prove that the disease is not infectious and therefore not a true tuberculosis. Relatives dying from tuberculosis either prior or subsequent to the deaths of the granite workers dying from tuberculosis have been relatively few among the wives and daughters. On the other hand, among fathers, sons, and brothers, deaths have been more common, although less exposed to personal contact. They probably contracted the disease in employment.

The disease should be studied and new means of treatment together with preventive measures adopted. This should be to the interest of the State, the employers, and the labor organizatons since the dath rate is so appalling.

The biggest burden probably falls on the industry itself, since the disease takes from it the most skilled workers and discourages apprentices from entering the industry.

A Shift of Emphasis Needed in Personnel Research. HARRY D. KITSON. The Journal of Applied Psychology, Vol. VI, No. 2, June, 1922.

Makes a plea for the shift of emphasis in personnel work from the analysis of the individual to the analysis of the job. Psy-

chological tests in industry are on a distinct plateau. Therefore, the psychologist should change his methods and the job should be analyzed. Three principles should be followed in analyzing the job: first, the job should be analyzed in terms of itself, Present methods violate this rule in three ways: (a) The psychologist "gazes" at the occupation and then concludes that certain mental processes are involved and gives tests for those mental processes; (b) Lists of traits involved are made and this is called the characterization of the occupation; (c) Experts in the work investigated are asked to state traits necessary for their occupation. Second, the requirements of the job should be expressed in quantitative terms. Third, analysis should be made minutely. Such an analysis may give the psychologist a firmer basis for making tests or may result in an entire discard of testing in vocational guidance. However, other benefits will be obtained from the making of the job analysis. Errors and waste will be reduced, a standard of performance will be provided, a scientific wage will be established, efficient ways of adjusting, operating, and maintaining machines will be developed, accurate cost items will be obtained, promotion routes will be marked out, and it will form the basis for adequate occupational training.

The Nation's Needs and the Schools. William Mather Lewis. The Survey, May 27, 1922, pp. 318–ff.

Discusses the nation's needs and the necessary changes in modern educational practice to meet these needs. Advocates the following measures:

(1) A further reduction of illiteracy through more strictly enforced compulsory school attendance laws.

(2) An expansion of night school opportunities for the foreign born.

(3) An improvement of rural school facilities both from the standpoint of the pupil and of the teacher.

(4) Changes in curriculum so that the work in each grade will be not only a preparation for the grade above, but first and foremost a preparation for life.

(5) Proper medical inspection and physical training in all schools.

(6) The establishment of habits of thrift.

(7) A more careful consideration of the life work which the youth of America will enter and a more intelligent preparation for it.

(8) A knowledge of the history, customs and trade methods of foreign nations.

(9) Sharper attention to the preparation of our youth for public service.

Experimental Observation upon the Relation between Atmospheric Conditions and the Production of Fatigue in Mine Labors. A. J. Orenstein and H. J. Ireland. Journal of Industrial Hygiene, May, 1922, Vol. IV, No. 1, pp. 30–46, and June, 1922, Vol. IV, No. 2, pp. 70–91.

A report on experiments made in Rand Mines of South Africa on the causes and results of fatigue. The 'freshness' of the atmosphere is due to the cooling effect on the body, and this cooling effect is increased by low temperature, low humidity, and high velocity of motion of the air. Providing the worker with an atmosphere with high cooling properties will increase output, and have a generally beneficial effect on health. No evidence was found of the presence of organic toxins in exhaled air, and the presence of 1 per cent or higher carbon dioxide content produced no deleterious effects on the human system, the only effect being slightly greater ventilation of the lungs. The tests made, with detailed description of the apparatus used, are given, which show methods of measuring the cooling power of the atmosphere, the output of work under different atmospheric conditions, and the efficiencies of workers in different cooling atmospheres. Conclusions reached are:

(1) Working efficiency decreases and fatigue increases when working in atmospheres of low cooling power.

(2) Working in hot places is a greater physical strain on the worker in winter than in summer.

(3) It is inadvisable to put a new worker, or one returning from a holiday in a hot place. He will probably do better in the

hot place after some training in cool or moderately cool places.

(4) The effect of a short rest at half time is not sufficiently pronounced to make it worth while.

(5) Subjecting workers to extremes in cooling atmospheres found in present conditions may severely tax their defensive mechanism.

(6) Auxiliary ventilating apparatus in places where working conditions are bad will usually pay for itself by the increase in ouput.

(7) Under some of the bad conditions found underground, four hours continuous work at full capacity is apparently all the average native can stand without an unduly prolonged rest period.

An Investigation into the Packing of Chocolates (II). B. Muscio and R. St. C. Brooke. The Journal of the National Institute of Industrial Psychology, April, 1922, Vol. 1. No. 2, pp. 68–75.

A previous article dealt with improved methods of work in chocolate packing. The present one shows how the efficiency of backward workers can be improved by a suitable course of training in the best methods of work.

To corroborate this hypothesis, five inefficient girls, A, B, C, D, E were given a course of training by Z, a skilled worker who showed them how to arrange their materials systematically, thus reducing to a minimum the range and number of the worker's movements; and how to work with both hands in a rhythmical, easy manner. Each girl's speed at the beginning of the four to five weeks training period was noted and compared with speed acquired at the end. "The effect of the training given was an average increase of efficiency of nearly 27 per cent.

In a later investigation, twelve novices chosen by the Employment Department were given a six weeks training course, similar to the one previously described. A week after these twelve "trained packers" had begun actual work a large number of new girls were drafted into the packing room. The overlooker did what she could to help these girls but was able to give them only a general supervision. The five best of the untrained novices were compared at the end of their fifth week with the five best of the twelve trained novices during their fourth week of training. The conditions of the test were in all respects identical. The results are in terms of minutes necessary to complete the operation. A is the untrained group, B, the trained.

PROCESSES	A	B
Folding shoots	22	22
Filling trays	62	47
Weighing	17	14
Packing boxes	115	90
Cording	29	20
Ribboning	31	20
Wrapping	48	43
Total	324	256

These results show that the novices who had received no systematic training were 21 per cent less efficient in speed of packing than the novices who had been in training. In explaining the causes of this large difference between two groups apparently equal in initial ability the authors agree that the usual method of permitting inexperienced girls to enter the packing room untrained and of expecting men to pick up superior methods by observing other workers is unreasonable.

(a) The movements of expert workers are usually too rapid to follow.

(b) In many cases the skilled worker does not know what movements she makes and so cannot explain them.

The experience in this factory makes it evident that the training of backward workers and novices is of great value for:

(1) It enables the new worker quickly to attain a good standard of efficiency.

(2) It gives to all workers passing through the school the opportunity of earning the maximum amount of which they are capable.

(3) It enables the firm quickly to weed out those girls who are unlikely to become efficient packers.

(4) As the labor turnover among women workers is high, due to many leaving when they marry, a trained force can be obtained in a very short time.

The Tapping Test: A Measure of Motility. MERRILL J. REAM. Psychological Monograph, Vol., XXXI, No. 1, pp. 292–317.

The purpose of this experiment, in general, was to measure a basic motor capacity, in particular, to plan a test which would call into play a simple repeated movement, fundamental, native in character and easy to measure, and which would *not* call into play accessory, coordinated, and learned movements. Motility is the term used to define this fundamental capacity for speed in a simple repeated movement. The tapping test as a measure of motility has the advantages of being objective, simple, easily given and easily learned. The improved apparatus which was used in the latter part of the experiment consisted of a Veeder chronometer mounted with a double coil door bell magnet of eight ohms' resistance, size of each coil approximately 1½ inches by 1 inch. The magnetic pull on the armature was direct and it was attached to the chronometer at a small radius, thus necessitating but a short movement of the armature to operate. The counter was further equipped with a double action key which, connecting with the metronome circuit, insured accurate timing of the tapping period. The methods of manipulation and directions for using the test are given in detail. Certain sources of error in the tapping test are pointed out; e.g. too much muscular effort in tapping interferes with the subject's maximum speed, and occasionally a muscular rigidity results in a momentary paralysis. This can be corrected by having the subject test less forcefully and with a less tense position of the arm. The right tapping procedure has to be developed in order to overcome incorrect position habits. The effects of practise were tested with six adult subjects and the amount of gain found to be very small. Three subjects showed practically no improvement due to the fact that they developed good technique the first day and were thereafter regular in their procedure. For the test group 164 Sophmores in the University and 130 children of Grades I to VI inclusive were given the tapping test under standard conditions. Tapping was found to increase with age and physical growth. Men were faster than women and boys were faster than girls. The women showed larger mean variations on every trial than the men but the large initial variations of the women was reduced in the later trials. The correlation between speed score and regularity score, (M. V., 164 cases) proved to be r. = 0.32, P. E. 0.05, showing that a positive correlation is present but is not marked. Four combinations of speed and regularity were found: fast and regular, fast and irregular, slow and regular and slow and irregular. For the most part the fast tappers were the more regular and the slow tappers the less regular. General motor quickness is dependent on power of coordination, temperament, muscular habits, training and environment but the chief factor in tapping rates is probably a physiological openness of nerve paths which is inherited. The present study has standardized an apparatus and a method for giving the test. There remains to be studied its diagnostic value in determining proficiency in many lines of industrial work, by testing persons engaged or about to engage in the specific line of industrial work. Motility is an important capacity for telegraphers, typists, musicians, packers and folders, and persons in many other similar occupations.

Some Pitfalls in the Administration Use of Intelligence Tests. M.R. TRAHUE. Journal of Educational Research, June, 1922.

"The possibility of measuring such qualities as mental capacity and intellectual alertness has aroused the public interest, and intelligence tests are now being applied in all parts of the country and by persons with little or no preparation for such work." There are many dangers in the use of tests which can be appreciated only by those who have had thorough training and extensive experience.

An inadequate understanding of the scope and significance of tests may lead to serious difficulties. Most intelligence tests involve only a few out of a broad range of abilities, and no two tests measure exactly the same combination of qualities. "We are certain that we do not yet have any system of tests in which exactly the proper elements are

combined in exactly the proper proportions to make a perfect test of general intelligence." It is certainly a mistake to claim that the group tests used in our schools are measures of general intelligence. Most such tests favor students who can easily handle words and abstract ideas, just as college instructors give highest grades to those whose abilities are like their own. Successful business men do not usually come from honor students at college.

After all, it is really more important to measure specific types of intelligence. Present group intelligence tests should be acknowledged as measures of "certain elements of a relatively specific ability to do abstract thinking with words and symbols." The tendency to use the results of intelligence tests as a basis for the classification and promotion of pupils, more or less regardless of the judgment of teachers, must be corrected. The tests should supplement the teacher's judgment, but "should never be substituted for common sense and good judgment." The time has not come when an intelligence test score may be trusted when it contradicts the thoughtful judgments of teachers.

Exaggerated confidence in the accuracy of the test results is another danger. The use of such phrases as "scientific measurements" and the numerical character of the scores obtained, lead to assumptions of extreme accuracy. "Another source of false confidence has been the adoption by the makers of group tests, of the Intelligence Quotient technique, devised by Terman for the Stanford Binet Examination. The truth of the doctrine of the constancy of the I. Q. has not been sufficiently demonstrated in the case of the Stanford Examination itself, but as soon as its truth is asserted in connection with the far less accurate group examinations, a sad state of affairs has been reached in the science of mental measurements."

A third type of error is due to loose reasoning about the results of tests. Some false inferences are: (1) that pupils who make low scores in a so-called intelligence test would succeed relatively better along trade lines, in manual arts, or in unskilled labor; (2) that pupils who make scores of a certain size will not profit by further training; (3) that those who make high scores do not need special attention or training, because they will take care of themselves.

The most serious pitfalls of all are those concerned with the treatment applied to situations revealed by tests. Tests of ability along various lines furnish data upon which to build an educational program; but they do not in themselves provide such a program.

Wages and Hours of Labor in Anthracite Coal Mining in Pennsylvania in January, 1922. Monthly Labor Review, May, 1922, pp. 1–8.

The earning and hours of anthracite coal mine employees presented in this article were compiled from wage data obtained from the records of twenty-nine representative anthracite collieries for the half-month pay-roll period ending January 31, 1922. The inquiry covers a total of 21,999 employees.

"Contract miners" is the basic occupation of anthracite coal mining. The employees in this occupation are paid a tonnage or other piece rate; they may have one or more helpers, known as contract miners' laborers. The wages of the latter are paid principally from the gross earnings of the contract miners, but the larger share of the contract miners' earnings goes to them. In the twenty-nine collieries there were 6209 contract miners and 3383 contract miners' laborers.

Table 1 shows the daily rate for consideration miners and company miners and their laborers; the days and hours of operation; the tons produced per capita; average earnings per hour.

The first section of Table 2 relates to contract miners and their laborers who are paid at tonnage or other piece rates, and the second section relates to all the other employees who are paid at time rates.

The Psychology of Vocational Selection. Arthur W. Kornhauser. Psychological Bulletin, Vol. 19, No. 4. April, 1922. pp. 192–229.

Mr. Kornhauser limits vocational selection to "the matter of choosing men to fill

particular jobs" and reviews practically the whole of published literature on this subject. Beginning with the recent history and present status of vocational selection in industry, he summarizes critically in turn the literature on analysis of the requirements of vocations, analysis of the qualifications of applicants for work, and analysis of the qualifications of workers already employed.

"Functionalized and centralized employment," which necessitates knowledge of requirements of jobs and of the equipment of the individual worker, has lately brought the problem of vocational selection into prominence and the scientific attack on it is scarcely a decade old. The pioneer book in the field was Münsterberg's Psychology and Industrial Efficiency, which appeared in 1913. The world war gave great stimulus to development along this line, and the personnel movement in American industry, which began in 1916, had as one of its major interests the scientific selection of workers. The rapid expansion of personnel work following the war, though attended by many unscientific offshoots, has resulted in a decidedly significant body of material in scientific employment methods and psychological technique has gained a permanent place in connection with personnel problems. "A certain amount of "overselling" of the possibilities of psychological selection must be lived down; a considerable body of unscientific work must be scrapped; . . . . a host of painstaking and thorough researches must be pushed to completion. The lean years of the business cycle, ... are but forcing a purification of the soul of industrial psychology."

Analysis of the Requirements of Vocations

The foundations of job analysis may be traced to the scientific management movement and to vocational guidance. Münsterberg, Bloomfield and Seashore have pioneered in this latter field. "The voices of early writers come not from industrial plants but from vocational guidance offices, libraries, and arm-chairs." Much of the literature is in loose terms impossible for actual use in selection.

The rise of centralized hiring in industrial plants forced accurate studies of job requirements. Some fairly definite, systematic work had been done previous to the war. The intensive development of this phase of personnel work in the army, however, served as a tremendous advertising influence and led to much wider study of job requirements in industry. The recent emphasis is upon the need for descriptions that are more definite, concise and standard, couched in quantitative and determinable terms, and upon the analysis of requirements "that are differentially characteristic of particular jobs." However, "a vast amount of essentially nonquantitative information exists which is and will continue to be, despite advances in test methods, an essential part of job specifications."

Analysis of Qualifications of Applicants

Psychological methods have been applied hardly at all in connection with interviewing applicants and interpreting the information obtained from application blanks. Some writers present good principles of interviewing, but most concrete suggestions are based on personal opinions. Scott's rating scales and the methods developed by the Committee on Classification of Personnel in the Army are the most important contributions of a positive sort. Several writers, however, have made studies of the unreliability of ordinary interview methods. In general it is true that we are not beyond the rule-of-thumb stage in the sizing up of applicants.

Character analysis systems, which make use ot physical characteristics as indications by which to determine moral qualities and personality traits, are criticized along four lines: "(1) The physical observations themselves are inaccurate and unreliable. (2) No scientifically valid evidence has been adduced in support of the alleged relations between the physical and mental characteristics. (3) The theoretical bases are unsound. (4) Estimations of characteristics from photographs under experimental conditions have shown highly unreliable results." Evidence on all these counts is presented.

Tests have been the most distinctively psychological contribution to vocational selection, and have been very popular since the war. The movement is still immature and selective tests adapted to industry are still few. "There is a danger of 'overselling' tests and a tendency to speak of selective tests as an accomplished fact and not as a valuable field for experiment."

Actual evidence of the demonstrated value of tests is scant. Thirty-five out of 172 companies reporting to the National Association of Corporation Training, reported the use of tests in employment, but little of this work has been scientifically evaluated. "To further a healthy growth of tests in employment, there is need for as much convincing evidence as can be assembled. This means: (1) the publication of actual results from all sources; (2) the non-suppression of negative results which are all too frequently doomed by the constant bias that tests *must* work, or reflect upon the experimenter; (3) the adoption of a more critical scientific attitude in place of the tone of special pleading apparent in part of the literature; (4) the use of more nearly justifiable statistical procedure and the more cautious interpretation of statistical findings."

Commenting on the last of these four points, the author mentions such questionable procedures as "the use of correlations of attenuation when working with test predictions," "the uncritical use of multiple correlation without mention of the large error to which it is subject," and "the interpreting of a relationship found in a selected group as true of a non-selected group." A correlation coefficient based on a selected group does not tell how reliably men can be selected from a random sample of applicants. "The conditions of try-out of a selective test and the nature of the group used should be as nearly as possible identical with the conditions and the group with regard to which the test is to be used in actual practice. The reason is obvious. A test may successfully separate the upper extreme of a group from the lower extreme and still be of very slight value in separating the upper or lower extreme from the large intermediate assortment. Concretely, a test may separate extremely good salespersons from extremely poor ones and yet not be a test worth using. The real question is: How well does this test enable me to select good and poor salesmen from the general run of applicants. The answer can be obtained only by trying out the test on a group that is more or less nearly identical with a group of applicants."

Tests of general ability took a long step in advance through the successful development and use in the army of a general intelligence test. The principal suggestions of Army results for industry are: (1) "Intelligence tests can be successfully used (a) to eliminate low-grade workers from industrial tasks where they would be dangerous or incompetent, and (b) to call to the attention of the management, men of exceptional alertness. (2) Striking and significant differences were found in the range of test score for different occupations." . . . . "The significance of these differences for vocational selection is that they point to the possibility of establishing standards for different occupations."

The Army test and many similar tests are used in industry, primarily "to select individuals of the appropriate level of ability and to indicate ones who are too high or too low for the work considered. Standards are usually set by reference to the degree of efficiency on the job of individuals making different test scores."

Special tests for particular jobs came into prominence with Münsterberg's experiments, and have received increasing attention, the point of greatest intensity being tests to select aviators during the war. Special tests are of four kinds: (1) Miniature representations of the job, (2) Samples of the job, (3) Analogues of the job, and (4) tests chosen empirically with no obvious relation to the job. "Typically, the empirical procedure begins with hunches that fall into one of the other classes." In trying out and standardizing tests for particular jobs, comparison of test scores of applicants with their later accomplishments, is the most desirable, "since it most nearly measures precisely that relationship which is involved in predictions when the test is put to practial use."

Five groups of special tests have been developed: (1) tests for clerical and office workers; (2) tests for salespersons; (4) tests for aviators and other military vocations; (5) miscellaneous special tests. The tests for clerical workers are in the main either intelligence tests or proficiency tests. Tests for factory workers are few in number. Link's work with shell inspectors, shell gaugers, assemblers, machine operators, and apprentice machinists, is the "outstanding example of thorough-going scientific procedure in factory or workshop."

Tests for salesmen and department store salespeople, have been a subject of experimentation at Carnegie Institute of Technology, particularly in the Bureau of Personnel Research, but the results are confined to private reports.

Discussions of trade tests are limited almost entirely to reports of the Army work, for little has been added to the Army developments. . . . . "It appears that much of the work going forward has not been evaluated and reported, for the 1921 report of the National Association of Corporation Training (now the National Personnel Association) states that 26 companies use occupational tests and 25 use educational tests."

Analysis of the Qualifications of Workers Already Employed

Vocational selection is frequently concerned with selection from among employes already at work. A primary requisite of such selection is a set of adequate records concerning the man during his period of employment. These records, in addition to tests and other devices, are: (1) rating of characteristics and efficiency by immediate superiors; (2) progress records. Rating scales were first used in recording judgments of applicants and sprang into prominence as a result of their use in the Army. The Army scale for rating officers, based on man-to-man comparisons, has been widely adapted to industrial use, though later researches have shown errors in the method of its use. The graphic rating scale, now also widely used, has proved superior to the Army method, combining the two features of checking on a line, and having the standards specified by descriptive terms. However, only one study has been made as to the relative merits of different rating systems.

Rating methods in general have been subjected to considerable criticism. As to the validity of judgments of character traits, the judgments have been found to vary widely in reliability, depending upon the qualities used, the individuals rated, and the persons submitting the ratings. One writer's argument against the entire assumption that ratings on unlike qualities can be summated, "overlooks the fact that the numbers added are not estimates of unlike things but rather estimates of the effect of unlike qualities upon a single linear variable, namely, the man's competence for a particular occupation. Thorndike has pointed out from statistical evidence that a constant error runs through the ratings on separate qualities—a "halo" effect which spreads to all the separate qualities. He suggests, accordingly, that the rating official "should report the evidence, not a rating, and the rating should be given on the evidence, to each quality separately."

Thorndike's "Fundamental Theorems in Judging Men" and Kelly's "Principles Underlying the Classification of Men," go into the logic of rating method and lay down theoretical principles for the construction and use of scales. "Studies of this sort make vivid the intricacy of the problem and the constant necessity for careful experimentation and statistical treatment by trained workers." In considering the problem of weighting and combining contributing elements to give the most adequate prediction of a man's success, Thorndike concludes that "we must assign weight to the traits according to (1) their relation to fitness, (2) their partial constitution by common elements, and (3) any dependencies whereby one gains or loses in influence according to the amounts of the others which are present. The last necessity is especially disconcerting. It arises from the fact that qualities may have vastly different significance, depending upon the extent to which some other quality or qualities are present.

Thorndike suggests that informal intuitive judgments in the past have derived their strength, as compared with formal scales, from the fact that they have allowed for the interdependence of traits. He thinks, perhaps too optimistically, that sufficient insight and invetisgation should enable us to secure all the advantages of the impressionistic judgment (except its speed and convenience) without any of its defects. To date, however, we are still without evidence that the formal analytical rating method has given either better or worse results than could be obtained under the same circumstances by a single impressionistic judgment."

Almost two hundred references to literature on vocational selection are appended.

Harmful Conditions Resulting from Adenoids. Public Health Reports, United States Public Health Service, Vol. 37, No. 21, May 26, 1922.

It is essential that we breathe through the nose. The nose is so arranged that as the air is breathed, it is strained, warmed, and moistened. About 10 per cent of all children, however, have adenoids which prevent proper breathing.

Adenoids are caused by an increased amount of "lymphoid tissue. This tissue acts as a filter for the impurities breathed in with the air.

Owing to their position and structure, adenoids are not only specially subject to infection and inflammation, but they also interfere with breathing. Infection of the nasal passages is possible with the result that the child affected with adenoids may have chronic catarrh, deafness, and repeated colds. Acting mechanically adenoids cause broadening of the root of the nose and disfiguration and other unpleasing alteration of the facial expression. Malformation of the jaws is also possible.

Children who suffer from adenoids are usually pale, often have narrow and otherwise deformed chests, and are not strong and robust.

The presence of adenoids may be recognized, if the child sleeps with open mouth, snores a great deal, and has frequent strangling coughing spells.

Adenoids should be removed whenever they are large enough to give rise to marked symptoms. The operation is a simple one and not dangerous. It should be performed under anesthesia. Relief is immediate and the health and strength of the child usually improves rapidly.

The Ethics of the Professions and of Business. The Annals, Vol. CI, No. 190, May, 1922.

The May issue of THE ANNALS of the American Academy of Political and Social Science is not only a new departure in the field of personnel research, but the source of a type of informaion not hitherto in existence. Under its title, "The Ethics of the Professions and of Business" is assembled discussion of the various ethical standards affecting modern social and business relations, together with a unique collection of the codes of ethics that have been adopted by all the leading professions and by certain business organizations.

The three articles of Part I contain a general appreciation of the service ideal which gives social significance to all professional or business standards, and call for a deeper realization of the need not only for closer inter-professional cooperation, but a more unselfish devotion to public interest as well.

Parts II–VIII take up in turn the professions of law, medicine, engineering, architecture, teaching, librarianship, ministry, public service, social work, journalism and accountancy. In each case there is given a brief history of the profession and its justification of the term, its distinct group organizations and activities, its requirements of training and admission, its ethical standards and manner of their enforcement, and its heritage from the past and responsibility to the present. Supplementing the discussion throughout are references to the Appendix where are printed in full the respective codes adopted by the professions under consideration. Where there are no definitely formulated codes, as in the case of social work, in which the process of professional organization is still under way, proposed standards are suggested as a nucleus of interest to be developed in practical experience. Partic-

ularly interesting is a proposal for an ethical decalogue for the judiciary, a set of standards of timely significance, since only recently the American Bar Association has appointed a committee of which, it is believed, the Chief Justice of the United States is to be chairman, to engage in the task of formulating canons for the bench.

As indicated in its first title, "The Profession of Commerce in the Making," Part IX deals with the professionalizing forces in American industry and the organizations working for the advancement of better ethical standards for business. The "Truth-in-Advertising" Movement as carried on by the Vigilance Committee of the Associated Advertising Clubs of the World, the Canons of Commercial Ethics adopted by the National Association of Credit Men, the purposes of the Commercial Standards Council, the wide-spread campaign of the International Association of Rotary Clubs for the writing of codes of standards of practice for each business and profession, are described as indications of a new leadership in industry, the creative result of the ideal of the integrity of American business. A simple but comprehensive code of business ethics is proposed by Edward A. Filene of Boston and its social and industrial implications carefully analyzed.

Since industrial expansion and social progress are limited by the standards of professional and business conduct that guide men and women when engaged in making a living, this volume is a signal contribution to the highest development of modern social and business relations.

Wages and Hours of Labor in the Cotton Manufacturing Industry in Massachusetts. Monthly Labor Review, May, 1922, pp. 100–105.

This article presents the results of a partial survey of wages and hours of labor in the cotton manufacturing industry in Massachusetts, conducted by the United States Bureau of Labor Statistics in cooperation with the Division of Statistics of the Department of Labor and Industries of Massachusetts.

The data reported were obtained from the records of fourteen representative mills and over 16,380 employees. The figures used are for a payroll period in January, 1922, for thirteen establishments and for a March, 1922, payroll for one establishment. Tables are given showing average earnings per hour, average full-time hours per week, and average full-time earnings per week, for each of the principal occupations and for a group of "other employees" which includes all occupations not listed separately.

The averages for 1922 are shown in the table in comparison with like figures for preceding years, sometimes going as far back as 1907. No wage data are furnished for 1915, 1917, 1919 and 1921. Paralleling the averages are shown index numbers for full-time hours per week, earnings per hour, and full-time earnings per week, for which 1913 is taken as the base or 100.

The report summarizes wage cuts, days of idleness and other facts.

Comparison of Workmen's Compensation Insurance and Administration. U. S. Bureau of Labor Statistics. Bulletin 301.

The bulletin compares the various compensation insurance systems on the basis of cost, service, and security.

The cost of insurance to employers under different insurance systems may be indicated their expense ratios. The average expense ratio of stock companies is 38 per cent, of mutual companies 20 per cent, of competitive state funds, about 10.6 per cent, and of exclusive State funds, about 4 per cent. Under the exclusive State fund the cost to the employer is materially less. It is estimated that if all employers insured could be insured under exclusive State funds, there would be a saving of $30,000,000 annually to them.

The service rendered by different insurance companies is difficult to compare. Some pay promptly and others do not. The same is true of State funds. Self-insured employers are no more prompt than private companies or State funds.

Injured workmen, thus far, have not lost their compensation due to insolvency of State funds or due to the failure of mutual companies. Private stock companies have failed and in some cases self-insured employers have become insolvent.

In the various states having compensation the following systems of claim procedure are in use:

(1) Claim system. Reports are required from the employer, the attending physician, and the injured worker. On the basis of these reports the claim is adjudicated. Delay generally results from such procedure since the workman delays in filing his report. The three reports insure, however, that all sides of the case are heard.

(2) Voluntary agreement or direct settlement system. The worker injured and the employer sign an agreement setting forth all the facts in the case. This agreement becomes valid when filed with the State commission. Delay results often due to the fact that the employer is slow to submit the agreement to the commission. Thus payment is delayed since often the payments only start after the commission approves the agreement.

(3) Adjudication of cases on basis of employer's or insurer's agreement. This procedure is simple and compensation payments may be made immediately. However, only the employer's side of the case is presented.

(4) Hearing system. Under this system the worker appears before the commission in person and states his case. Thus the extent of his injuries can be observed. The hearings do not take place until quite a time after the accident so that payments are delayed.

Each system has its advantages and its disadvantages. The Solvency of State funds is the subject of some consideration in the Bulletin. Solvency depends upon the classification, rates, and the reserves and surpluses.

The classification into which an industry falls is in general established in the law but classifications are subject to change by the commission.

Rates are also formulated in the compensation law but are regulated from year to year so as to take care of losses. Many states levy monthly or quarterly assessments just sufficient to meet the losses as they occur.

The reserves determine the solvency of the fund. These reserves must be of two kinds; claim reserves and catastrophe reserves. Claim reserves are specified by law in some states; in others each claim is valued at the time of award and a reserve covering the probable incurred cost of each claim is set aside. Catastrophe reserves are set aside to protect against catastrophe losses and to equalize rates between classifications. Most laws specify that 10 per cent of the annual premium income is to be set aside as catastrophe reserve until such reserve equals $100,000 and 5 per cent thereafter until judgment indicates that the reserve is sufficiently great.

The administration of medical service is dealt with and Accident and compensative statistics are given for the states of Colorado, Washington, Oregon, Wisconsin, Nevada, Massachusetts, California.

Self-insurance is the carrying of compensation risks by the companies themselves. Such insurance is limited to large companies and they must prove their solvency and in some states they must deposit security. Such insurance has the advantage of inducing an employer to prevent accidents and thus reduce his costs. The urge to reduce costs may, however, become a disadvantage since the employer may tend to pare payments.

In many states the payments made to an injured workman are specified by law to be a certain percentage of his wage. The effect of this is reduced by a Weekly Maximum clause in the law which limits the amount he may receive.

To determine the payments to be made to a worker his wage must be computed. This computation may be made in any of the following ways:

(1) Full time. A certain period of time at one employment is specified as full time and on this basis the wages are calculated.

(2) Wages at time of injury.

(3) Part-time basis. The actual earnings for the period are generally divided by the number of weeks.

(4) Seasonal Occupations. The aggregate earnings for the year are divided by 52 or the number of days worked is multiplied by the average daily wage and divided by 52.

(5) Concurrent employment. If an employee holds two or more positions some states permit compensation only from the position in which injured while others base payments on what he made in all employments.

(6) Minors or learners. Wages may be computed on the basis of what he would have made at the age of 21 or what experienced workers in the same line of work make.

Besides wages, a worker may receive overtime pay, board and lodging, tips, gratuities, supplies, etc. Most states exclude overtime pay from the computation of wages but permit board and lodging. Tips are excluded in some ten states and permitted in thirteen. A few states permit gratuities to be included as p of the wages but in general they are excluded. Special expenses can not be included in wages by the rulings of most states. Eleven states exclude supplies, dues, etc., from the wages of a worker but eight permit them to be included. It can be seen that methods are different according to states.

The Bulletin considers the claim procedure under exclusive state funds, competitive state funds, and industrial commissions.

Under exclusive state funds the following states are considered: British Columbia, Nevada, Ohio, Ontario, Oregon, Washington, West Virginia. The states are discussed under the following outline:

(1) Claim procedure. 1. Accident reporting. 2. Permanent Disability ratings.
(2) Actuarial and Auditing Department. 1. Classification and rates. 2. Reserves. 3. Dividends. 4. Assessments. 5. Collections. 6. Accounting. 7. Pensions.
(3) Statistics.
(4) Self-insurance.
(5) Safety Work.

California, Colorado, Idaho, Maryland, Michigan, New York, Pennsylvania, and Utah are discussed under the competitive state funds using the same general outline.

The Industrial Commissions considered are California, Colorado, Idaho, Illinois, Indiana, Maryland, and Wisconsin. In general the discussion follows the outline given below:

(1) Accident Reporting and Claims.
(2) Statistical Department.
(3) Insurance.
(4) Safety Work.
(5) Reciprocals.

A Case of Sales Research: Report on First Steps in a Study of the Selection of Life Insurance Salesmen. JOHN MARSHALL HOLCOMBE, JR. Bulletin of the Taylor Society, Vol. VII, No. 3, June, 1922, pp. 112–121.

This paper was originally presented at a meeting of the Taylor Society, Philadelphia, March 16, 1922. Mr. Holcombe expresses his gratification that the Taylor Society is extending its interest to sales research, a field in which little scientific work has previously been attempted. His own illustrations are drawn from studies made of life-insurance salesmen. The pioneer work of the "Medico-Actuarial Mortality Investigation" has prepared insurance executives to think in terms of the average and to ask if the technique used in the selection of agents should not be similar to that used in the selection of risks. A few companies, using this hypothesis, have made preliminary studies. These results, although tentative, are interesting. "For example, in the matter of age, the experience of one company is that men entering the business below twenty-six show distinctly inferior results, as a group, in comparison with men from twenty-six to forty. The best group is that between thirty-one and thirty-five. Men entering the business above the age of forty show results not much better than those below twenty-six."

"Another study showed that increasing years of experience since leaving school and prior to entering the life-insurance business gave increased success after becoming life-insurance salesmen. This, of course, is linked up with the question of age, because a man who has been ten years out of school is naturally in a higher age group as a rule than a man who has just finished school. However, business experience is obviously of very great importance in the matter of selling."

In the matter of dependents, one statistical study showed that each additional

dependent seemed to predict slightly increasing success in the field. However, when men had more than four dependents the degree of success seemed to drop materially.

Mr. Holcombe reports in more detail a larger study made under his direction. This investigation was made with a view to predicting failures before they enter the business and thereby eliminating them without the expense involved in selecting and training them. The method was as follows: The personal history records of 447 men who were at that time in the employ of the company were accumulated and the group divided into successes and failures on the basis of production records. They next threw the cases into groups, according to age on entry, taking, for example, all those of 24 years. By use of statistical formulas, the significance of age difference was determined and weightings were given. Having done this on ten or a dozen other items, they were able to build up a composite score. Items which were put into the composite score were: marital state, schooling, number of dependents, insurance held at entry, number of years out of school, previous insurance selling, previous general selling experience, number of outside organizations to which the man belonged, number of investments he holds, whether he owns his own home or rents it. When this scoring method was tested out on a portion of the original group, they were able, by using a critical score of 1.5, to pick out a group 80 per cent of which would be successes, and to reject a group where the successes were only 43 per cent.

Conclusions: All previous studies have been made within a company and on relatively few cases. To alleviate this difficulty a pooled study is being made of the personal-history records of the agents of thirty life-insurance companies. "It is not with any belief that this system will eliminate the use of individual judgment but rather with the idea that the individual judgment may be guided in many cases by the erection of such guide-posts as I have discussed above. If, instead of one-hundred forty-eight cases, we had ten thousand, we would then have such accuracy as is possible in the mortality tables." "The field for sales research has barely been entered, the results so far achieved are mere indications of what may come in the future."